


**SOUTH AFRICA MAINSTREAM RENEWABLE POWER
DEVELOPMENTS (PTY) LTD**

Proposed Construction of the Hartebeest Leegte Wind Farm near Loeriesfontein, Northern Cape Province

**Final Environmental Management
Programme**

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**SOUTH AFRICA MAINSTREAM RENEWABLE POWER
DEVELOPMENTS (PTY) LTD**

**PROPOSED CONSTRUCTION OF THE HARTEBEEST LEEGTE WIND
FARM NEAR LOERIESFONTEIN, NORTHERN CAPE PROVINCE**

FINAL ENVIRONMENTAL MANAGEMENT PROGRAMME

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Glossary of Terms:

Construction Phase: The activities pertaining to the preparation for and the physical construction of the proposed development.

Contractor: Persons/organisations contracted by the Project Company to carry out parts of the work for the proposed development.

Decommissioning: Means to take out of active service permanently or dismantle partly or wholly, or closure of a facility to the extent that it cannot be readily recommissioned.

Engineer (E) / Project Manager (PM): Person/ organisation appointed by the Project Company to oversee the work of all consultants, sub-developers, contractors, residents and visitors.

Environmental Control Officer (ECO): Person/organisation appointed by the Project Company who will provide direction to the Project Manager concerning the activities within the Construction Zone, and who will be responsible for conducting the environmental audit of the project during the construction phase of the project according to the provisions of the Environmental Management Programme.

Environmental Management Programme (EMPr): The EMPr is a detailed plan for the implementation of the mitigation measures to minimise negative environmental impacts during the life-cycle of a project. The EMP contributes to the preparation of the contract documentation by developing clauses to which the contractor must adhere for the protection of the environment. The EMPr specifies how the construction of the project is to be carried out and includes the actions required for the Post-Construction Phase to ensure that all the environmental impacts are managed for the duration of the project's life-cycle.

Operational Phase (Post Construction): The period following the Construction Phase, during which the proposed development will be operational.

Pre-Construction Phase: The period prior to commencement of the Construction Phase, during which various activities associated with the preparation for the Construction Phase will be undertaken.

Rehabilitation: Rehabilitation is defined as the return of a disturbed area to a state which approximates the state (where possible) which it was in before disruption. Rehabilitation for the purposes of this specification is aimed at post-reinstatement re-vegetation of a disturbed area and the insurance of a stable land surface. Re-vegetation should aim to accelerate the natural succession processes so that the plant community develops in the desired way, i.e. promote rapid vegetation establishment.

Site Manager: The person, representing the Contractor, responsible for all the Contractor's activities on the site including supervision of the construction staff and activities associated with the Construction Phase. The Site Manager will liaise with the Project Manager in order to ensure that the project is conducted in accordance with the Environmental Management Programme

Abbreviations:

DEA	Department of Environmental Affairs
DoE	Department of Energy
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
ED	Economic Development
EO	Environmental Officer
EHS	Environment, Health and Safety
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
EP	Equator Principles
FMP	Fire Management Plan
HOD	Head of Department
IFC	International Finance Corporation (World Bank Group)
I&APs	Interested and Affected Parties
MC	Main Contractor
MSDS	Material Safety Data Sheets
NEMA	National Environmental Management Act
NSD	Noise Sensitive Developments
OECD	Organisation for Economic Co-operation and Development
OHL	Overhead Line
PM	Project Manager
PS	Performance Standards
SABS	South African Bureau of Standards
SAHRA	South African Heritage Resources Agency
SED	Social Economic Development
ASOD	Average Speed Over Distance

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PROPOSED CONSTRUCTION OF THE HARTEBEEST LEEGTE WIND FARM NEAR LOERIESFONTEIN, NORTHERN CAPE PROVINCE

FINAL ENVIRONMENTAL MANAGEMENT PROGRAMME

1 INTRODUCTION

South Africa Mainstream Renewable Power Developments (Pty) Ltd (hereafter referred to as “Mainstream”) are proposing to construct a wind farm and associated infrastructure near Loeriesfontein in the Northern Cape Province of South Africa. The proposed development will consist of a 235MW maximum export capacity wind farm referred to as Hartebeest Leegte Wind Farm. The overall objective of the proposed development is to generate electricity to feed into the National Grid.

This EMPr has been compiled in line with the recommendations in the above-mentioned EIA, as well as from issues identified by SiVEST. More details will be provided by the contractors and engineers once the detailed design has been completed.

1.1 Details of the EAP

As per the requirements of the NEMA (2014), the details and level of expertise of the persons who prepared the EMPr are provided in **Table 1** below.

Table 1: Consultant Team

Environmental Practitioner	SiVEST South Africa (Pty) Ltd – Andrea Gibb
Contact Details	andreag@sivest.co.za
Qualifications	BSc Landscape Architecture and BSc (Hons) Environmental Management
Expertise to carry out the EMPr	Andrea has 8.5 years’ work experience and specialises in undertaking and managing Environmental Impact Assessments (EIAs) and Basic Assessment (BAs), primarily related to energy generation and electrical distribution projects. She also specialises in undertaking visual impact and landscape assessments, by making use of ArcGIS technology and field surveys. She has extensive experience in overseeing public participation and stakeholder engagement processes and has been involved in environmental baseline assessments, fatal flaw / feasibility assessments and environmental negative mapping / sensitivity analyses. From a business and administrative side, Andrea is actively involved

in maintaining good client relationships, mentoring junior staff and maintaining financial performance of the projects she leads.

1.2 Site Locality and Description

1.2.1 Regional Locality

The proposed development is located within the Northern Cape Province, approximately 63km north of Loeriesfontein within the Hantam Local Municipality in the Northern Cape Province (**Figure 1**). The proposed development will be accessed by the R357 which traverses the northern section of the proposed application site.

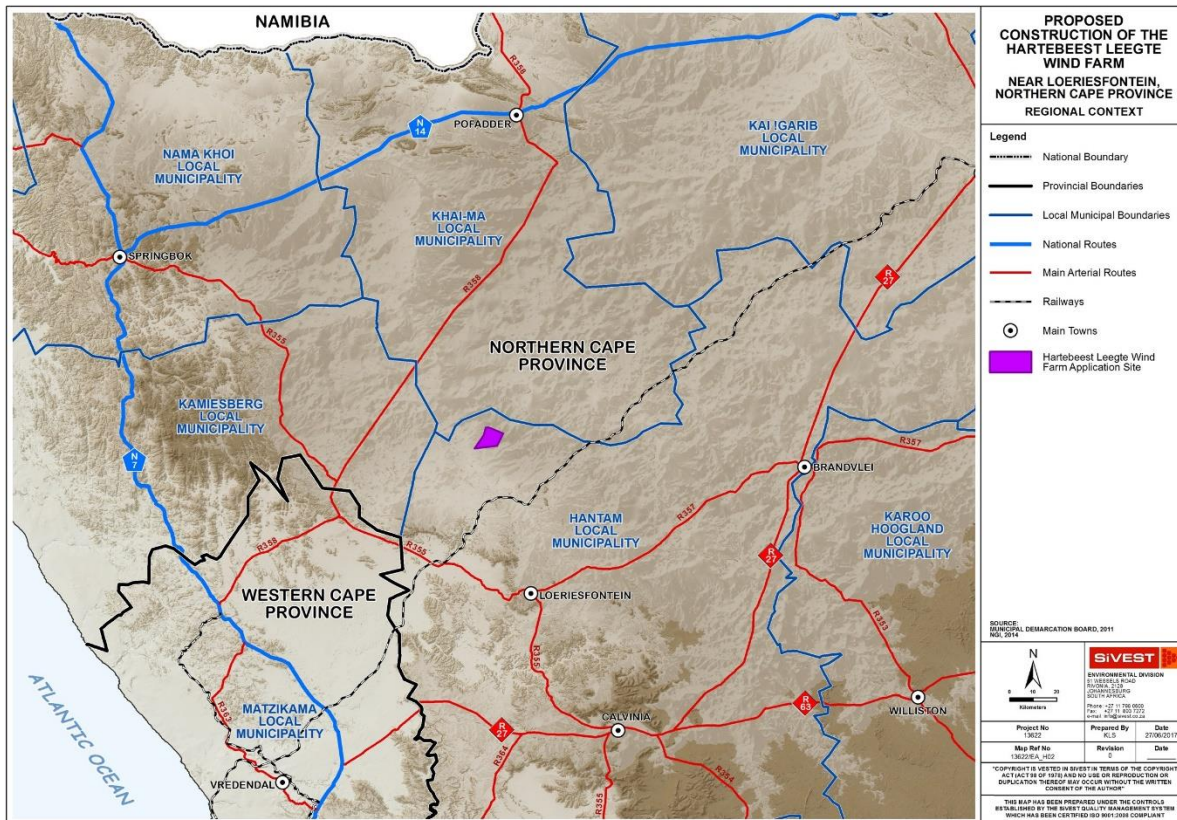


Figure 1: Regional Study Area

The site that is proposed for the Hartebeest Leegte Wind Farm is located on the following properties:

- Entire part of the Remainder of the Farm Hartebeest Leegte No. 216, cadastral number: C01500000000021600000.

The study area as shown on the locality map below comprises the entire part of the Remainder of the Farm Hartebeest Leegte No. 216. The total area of the application site is approximately 5094 hectares. Within the application site the Hartebeest Leegte Wind Farm development area has a total buildable area of approximately 3720.29 hectares (**Figure 2**).

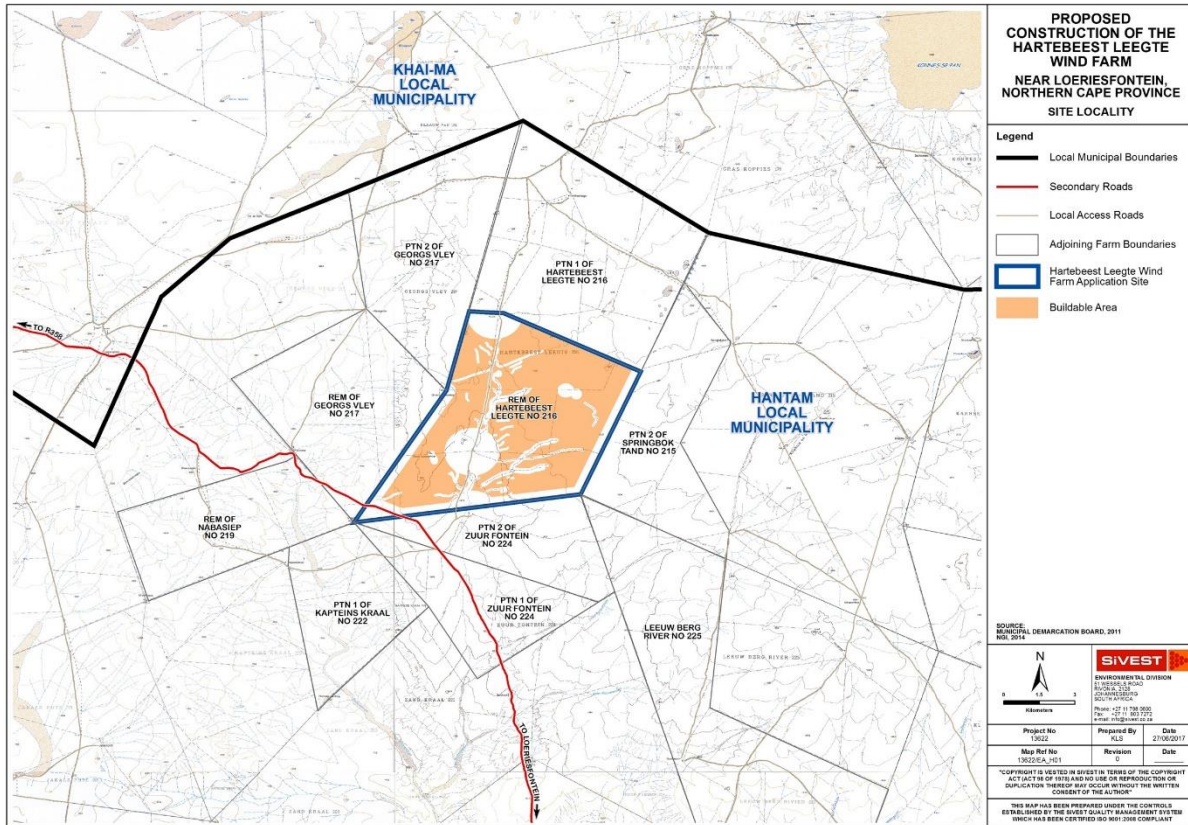


Figure 2: Site Locality

1.2.2 Study Site Description

Much of the land use in the wider study area is classified as bare (non-vegetated) although the north-western sector is characterised by grassland and low shrubland. Sheep farming is the dominant activity in the study area although the arid nature of the climate restricts stocking densities which has resulted in relatively large the farms across the area. The study area is therefore sparsely populated, and human-related infrastructure is largely restricted to isolated farmsteads and gravel access roads. The area is regarded as largely uninhabited and the closest built up area is the small town of Loeriesfontein approximately 63km to the south of the site.

1.2.3 Climate

The climate of the study area (Monnik & Malherbe, 2005) can be regarded as warm to hot with occasional rain in summer and dry winters. The long-term average annual rainfall in this region of the Northern Cape is only 198 mm, of which 138 mm, or 69%, falls from November to April. Rainfall is erratic, both locally and seasonally and therefore cannot be relied on for agricultural practices. The average evaporation is over 2 100 mm per year, peaking at over 8.5 mm per day in December.

Temperatures vary from an average monthly maximum and minimum of 31.6°C and 11.8°C for January to 15.9°C and 1.0°C for July respectively. The extreme high temperature that has been recorded is over 42°C and the extreme low –10.0°C. Frost occurs most years on 30-40 days on average between early May and mid-September.

1.3 Overview of the proposed project

The proposed development will encompass the installation of wind turbines and associated infrastructure, in order to generate electricity that is to be fed into the Eskom grid. The facility will have a maximum export capacity of up to 235MW and will be referred to as the Hartebeest Leegte Wind Farm. The final design details are yet to be confirmed. These details will become available during the detailed design phase of the project.

1.3.1 Wind Farm Components

The wind farm will consist of up to 47 turbines, each with a generation capacity between 4 and 8MW. The generated electricity will be fed into the national grid at the Helios Substation via a 132kV power line. It should however be noted that this 132kV power line will require a separate Environmental Authorisation and is being conducted as a part of a separate Basic Assessment (BA) process. The 132kV power line has been mentioned for background information but will be authorised under a separate BA to allow for handover to Eskom. The total extent of the development area is approximately 5094 hectares (ha). The total buildable area for the proposed Wind Farm is however 3720.29 ha. The operation and maintenance buildings will have a total combined footprint that will not exceed 5 000m². In addition, the 132kV on-site Hartebeest Leegte IPP Substation will occupy a footprint area of approximately 15ha.

The overall objective of the proposed development is to generate electricity to feed into the national grid. During the EIA process, specialist studies were undertaken and to address the potential impacts relating to the proposed development. An impact assessment was conducted to ascertain the level of each identified impact, as well as mitigation measures which may be required. The results of the specialist studies have indicated that no fatal flaws exist as a result of the proposed development. Additionally, the specialists comparatively assessed the alternatives and it was established that the layout alternatives avoid all no-go areas. The preferred site layout is indicated in **Figure 3** and **Figure 4** below.

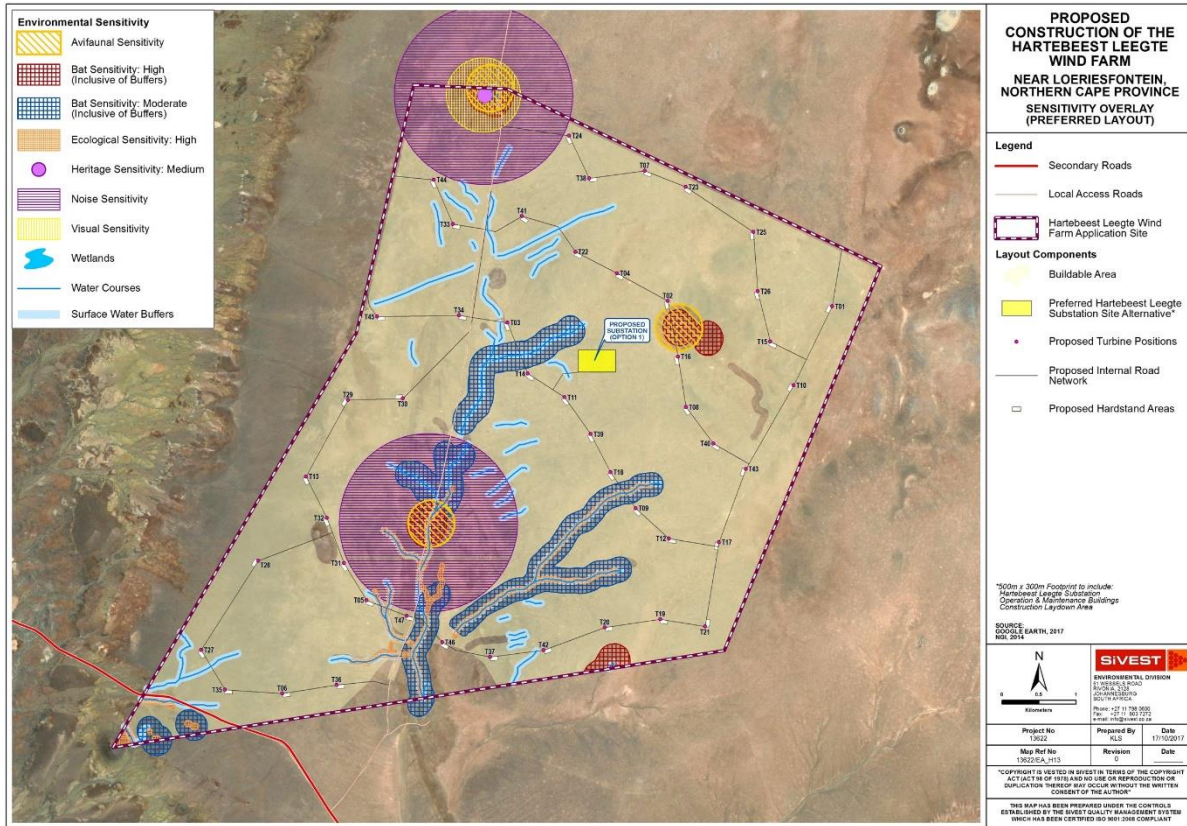


Figure 3: Preferred layout showing sensitive areas

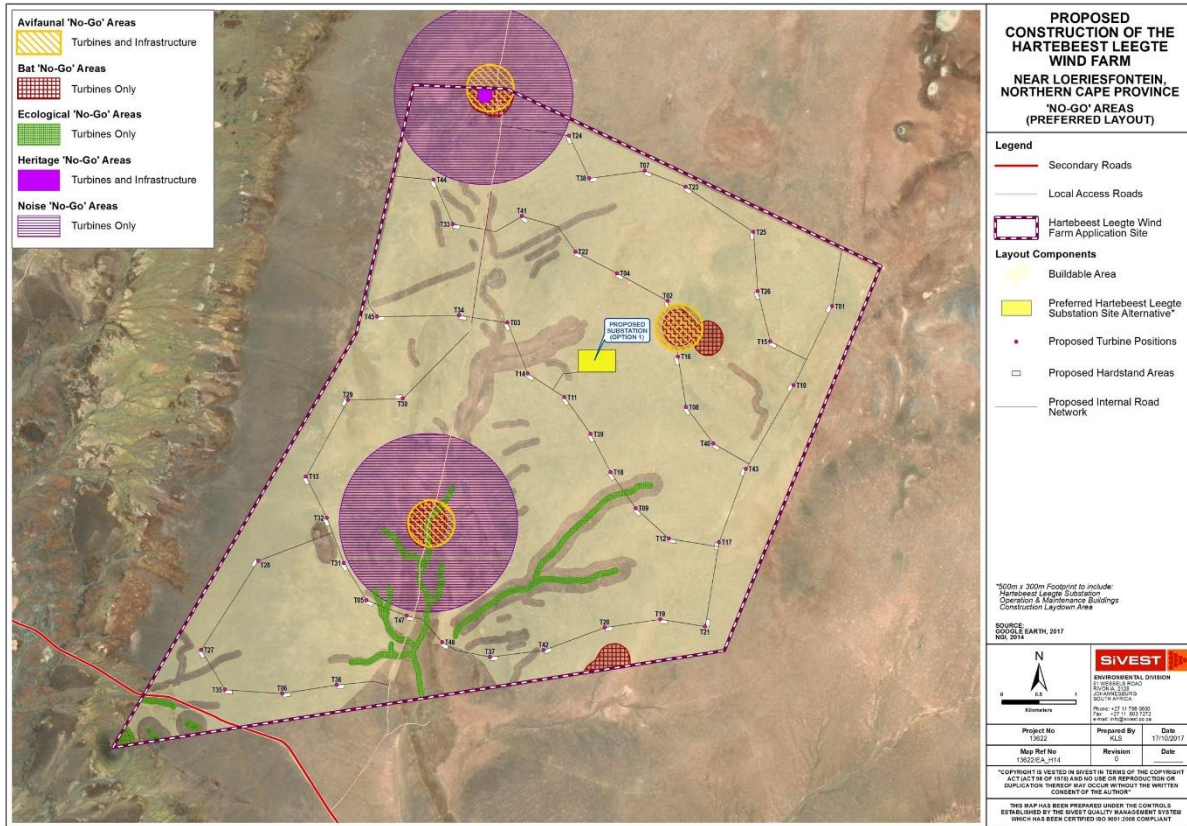


Figure 4: Preferred layout showing no-go areas

The key technical details and infrastructure required is presented in the table below (**Table 2**).

Table 2: Hartebeest Leegte Wind Energy Facility Technical Summary

Project Name	DEA Reference	Farm name and area	Technical details and infrastructure necessary for the proposed project
Hartebeest Leegte Wind Farm	14/12/16/3/3/2/1015	<ul style="list-style-type: none"> Remainder of the Farm Hartebeest Leegte No. 216. <p><u>Application Site:</u> 5094 ha</p> <p><u>Total Preferred Buildable Area:</u> 3720.29ha</p>	<ul style="list-style-type: none"> Up to 47 wind turbines, between 4MW and 8MW, with a maximum export capacity up to 235MW. Wind turbines will have a hub height of up to 160m and a rotor diameter of up to 160m. 132kV on-site Hartebeest Leegte / IPP Substation The turbines will be connected via medium voltage cables to the proposed 132kV on-site Hartebeest Leegte IPP Substation.

			<ul style="list-style-type: none"> ▪ Internal access roads are proposed to be up to 20 m wide. This would however only be for the construction phase as the width of the internal access roads will be reduced to 6m - 8m during the operational phase. ▪ A temporary construction lay down area. ▪ A hard standing area / platform per turbine. ▪ The operations and maintenance buildings, including an on-site spares storage building, a workshop and an operations building. ▪ Fencing (if required) will be up to 5m where required and will be either mesh or palisade.
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As previously mentioned, Mainstream is also proposing to develop the associated on-site Hartebeest Leegte Eskom and linking substations and power line, with a capacity of up to 132kV. This associated electrical infrastructure will require a separate Environmental Authorisation (EA) and is being conducted as a part of a separate BA process. The 132kV Hartebeest Leegte power line has been mentioned for background information but will be authorised under a separate BA to allow for handover to Eskom. The proposed 132kV on-site Hartebeest Leegte Substation will include an Eskom portion and an Independent Power Producer (IPP) portion, hence the substation has been included in the wind farm EIA and in the substation and power line BA to allow for handover to Eskom. Although the wind farm and the electrical infrastructure will be assessed separately, a single public participation process is being undertaken to consider both of the proposed developments. The potential environmental impacts associated with both developments will be assessed as part of the cumulative impact assessment. The DEA reference number allocated for the proposed 132kV on-site Hartebeest Leegte IPP Substation and 132kV power line development is **14/12/16/3/3/1/1868**.

1.3.2 Turbines

The total area of the application site is approximately 5094 ha. The total preferred buildable area for the proposed wind farm is however approximately 3720.29ha. The wind turbines and all other project infrastructure will be placed strategically within the application site based on the identified environmental constraints. The size of the wind turbines will depend on the preferred buildable area and the total generation capacity that can be produced as a result. The wind turbines will therefore likely have a hub height of up to 160m and a rotor diameter of up to 160m (**Figure 5**). Each wind turbine will have a foundation diameter of up to 25m and will be approximately 3m deep, however, these dimensions may be larger if geotechnical conditions dictate as such. The hardstand area occupied by each wind turbine will be up to 0.5 hectares (85m x 60m). The excavation area will be approximately 1 000m² in sandy soils due to access

requirements and safe slope stability requirements. A hard standing area / platform of approximately 2 400m² (60m x 40m) per turbine will be required for turbine crane usage. There will be up to 47 wind turbines constructed with a capacity up to 235MW. The electrical generation capacity for each turbine will range between 4 and 8MW, depending on the final wind turbine selected for the proposed development. It must be noted that the final selection for the turbine type will be conducted after the project has been selected as a Preferred Bidder project under the Department of Energy Renewable Energy Independent Power Producers Procurement Programme (DoE REIPPPP). This is as a result of technology constantly changing as time progresses.

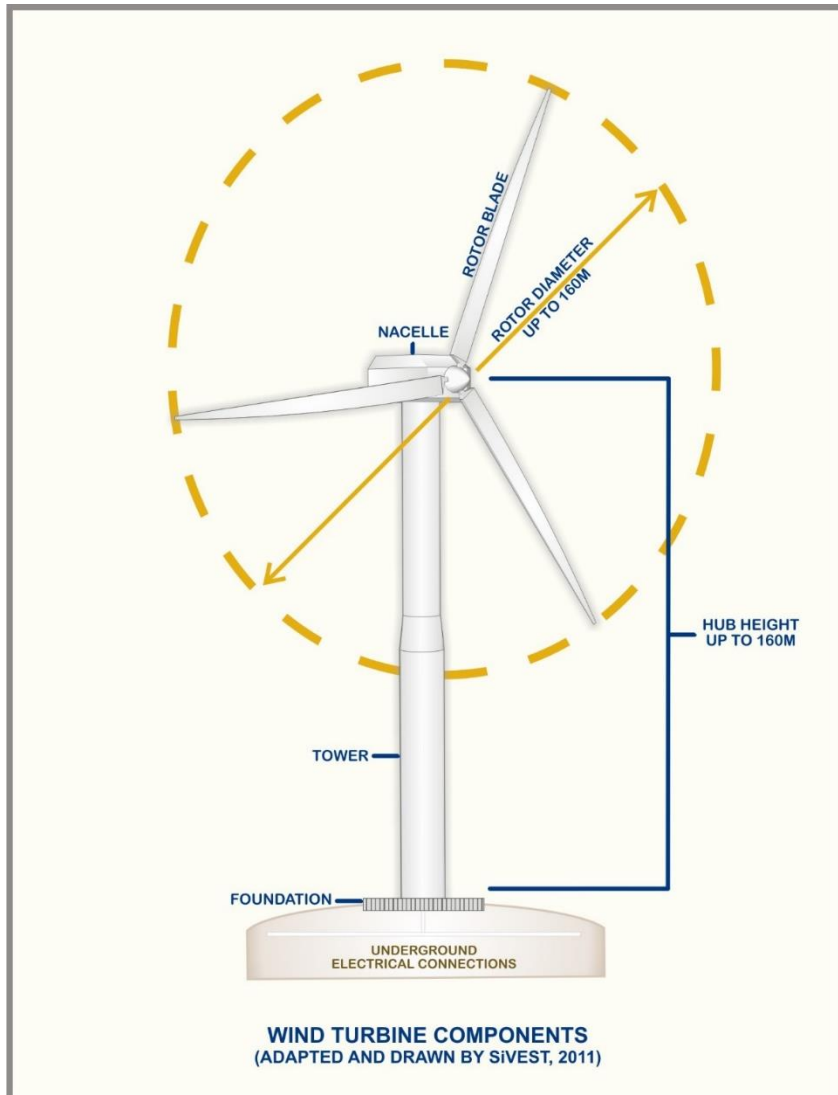


Figure 5: Typical Connections of a Wind Turbine

1.3.3 Electrical Connections

The wind turbines will be connected (Figure 6) to the proposed 132kV on-site Hartebeest Leegte IPP Substation using buried (up to a 1.5m depth) medium voltage cables except where a technical assessment

of the proposed design suggests that overhead lines are more appropriate such as over rivers, gullies and long runs. Where overhead power lines are to be constructed, self-supported or H-pole tower types will be used. The height will vary based on the terrain, but will ensure minimum Overhead Line (OHL) clearances with buildings, roads and surrounding infrastructure will be maintained. The dimensions of the specific OHL structure types will depend on electricity safety requirements. The exact location of the towers, the selection of the final OHL structure types and the final designs will comply with the best practise and SANS requirements.

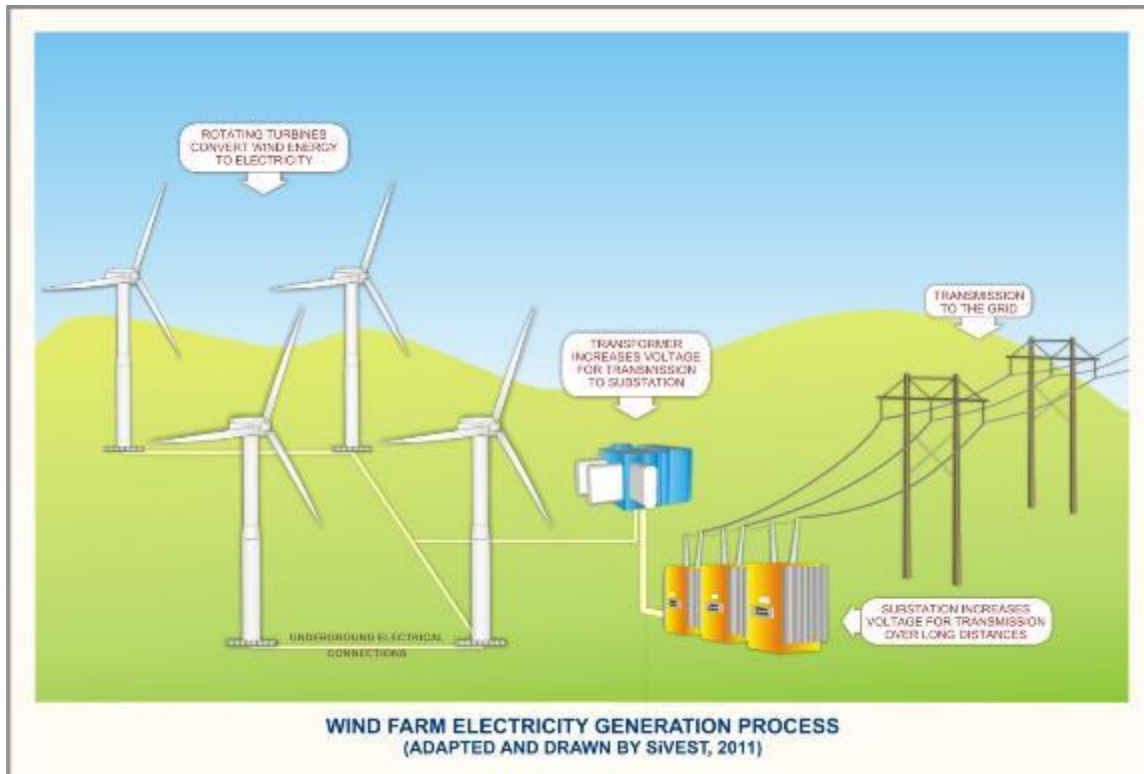


Figure 6: Conceptual Wind Energy Facility Electricity Generation Process showing Electrical Connections

1.3.4 Roads

Internal access roads with a maximum width of 20m are initially being proposed for the construction phase. This is however only temporary as the width of proposed internal access roads will be reduced to approximately 6m - 8m for maintenance purposes during the operational phase. The proposed internal access roads will include the net load carrying surface excluding any V drains that might be required.

1.3.5 Temporary Construction Area

The temporary construction lay down area will be approximately 10 000m² (100m x 100m) and will include an access road and contractor's site office area of up to 5 000m². A hard standing area / platform of approximately 2 400m² (60m x 40m) per turbine will be required for turbine crane usage.

1.3.6 Operation and Maintenance (O&M) Buildings

The operation and maintenance buildings will include an on-site spares storage building, a workshop and operations building with a total combined footprint that will not exceed 5 000m². The operation and maintenance buildings will be situated in close proximity to the wind farm substation due to requirements for power, water and access.

1.3.7 Other Associated Infrastructure

Other associated infrastructure includes the following:

- Fencing (if required) will be up to 5m where required and will be either mesh or palisade.

1.4 Specific Conditions Pertaining to Authorisation

Should the Department of Environmental Affairs (DEA) issue an EA for the project, this EMPr will be updated to include all the pre-construction, construction, operation and decommissioning conditions stipulated in the EA.

Specific conditions pertaining to regulatory processes, or Licensee / Holder of the Authorisation requirements, have not been included within the EMPr. These conditions are to be undertaken by the Licensee / Holder of the Authorisation prior to the commencement of construction related activities.

1.5 Project Responsibilities

The roles and responsibilities of all the key role players involved in the EMPr are represented below.

1.5.1 The Project Company

The Project Company will be responsible for the overall control of the project site in environmental terms during the pre-construction, construction, operation, decommissioning and rehabilitation phases of the proposed project. These responsibilities include the following:

- Appointing an independent ECO for the duration of the construction phase and notify the DEA of their contact details;

- Being fully familiar with the EIA Report, EA conditions and the EMPr;
- Notifying the DEA of changes in the developments that result in significant environmental impacts;
- Notifying the DEA within 30 days of change of ownership;
- Notifying the DEA of any change of address of the owner/Project Company;
- The overall implementation of the EMPr;
- Ensuring compliance, by all parties, and the imposition of penalties for non-compliance
- Implementing corrective and preventive actions, where required;
- Preventing pollution and actions that will harm or may cause harm to the environment;
- Ensuring the activity does not commence within 30 days of the EA being issued;
- Notifying the DEA within 30 days that construction activity will commence;
- Notifying the DEA in writing within 24 hours if any condition in the EA cannot be or is not adhered to;
and
- Notifying the DEA 14 days prior to commencement of the operational phase.

1.5.2 Construction Team

Several professionals will form part of the construction team. The most important from an environmental perspective are the Project Manager (PM), the Contractor Project Manager (CPM), the Main Contractor (MC), the Environmental Control Officer (ECO), the Environmental Officer (EO) and the Community Liaison Officer (CLO).

The PM is responsible for the implementation of the EMPr on the site during the pre-construction and construction phases of the project.

The CPM is responsible for the establishment and management of contracts for the Main Contractor and the Sub-contractors.

The MC is responsible for abiding by the mitigation measures of the EMPr which are implemented by the Project Manager during the construction phase.

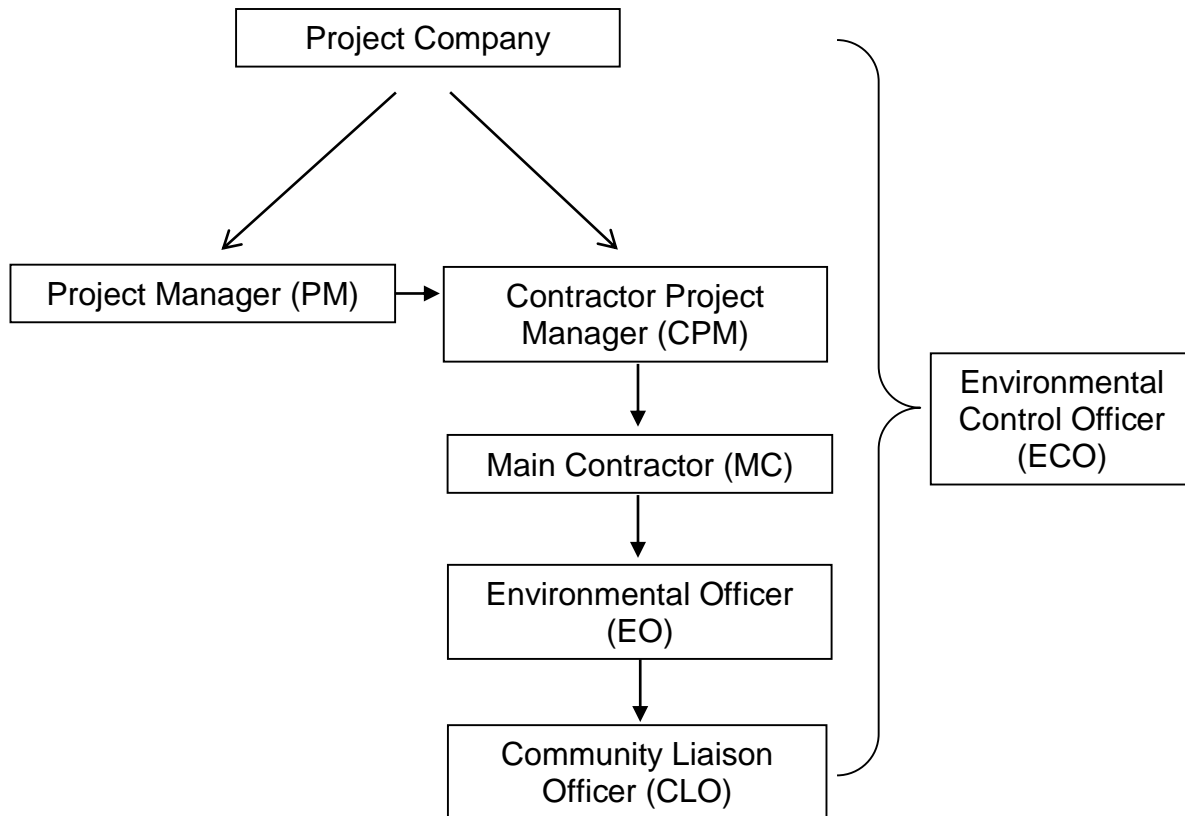
The MC is also responsible for the implementation of the EMPr during the operational and decommissioning phases of the project. However, it must be noted that the MC may change for each phase of the project. The EMPr will therefore be applicable to the relevant MC appointed for each phase of the project.

The ECO is responsible for monitoring the implementation of the EMPr during the design, pre-construction and construction phases of the project.

The EO is responsible for managing the daily onsite implementation of the EMPr.

The CLO is responsible for managing the daily on-site implementation of the social aspects of the EMPr.

Basic Organogram:



1.5.3 Project Manager

The PM is responsible for overall construction management of the project as well as the implementation of the EMP. The following tasks will fall within his / her responsibilities:

- Be aware of the findings and conclusions of the Environmental Impact Assessment and the conditions stated within the EAs;
- Be familiar with the recommendations and mitigation measures of this EMP, and implement these measures;
- Monitor site activities on a daily basis for compliance;
- Confine the construction site to the demarcated area; and
- Rectify transgressions through the implementation of corrective action.

The Project Manager will assume ultimate responsibility. However, the above-mentioned tasks can be delegated to the on-site manager for daily management.

1.5.4 Contractor Project Manager

The CPM will undertake overall project contracts management between the Main Contractor and the appointed Sub-Contractors. The following tasks will fall within his / her responsibilities:

- Responsible for establishing contractual agreements with the Main Contractor and Sub-Contractors, and ensuring that sub-contractors adhere to the EMPr;
- One of the key contracts will be for the supply, transport, erection and commissioning of the turbines.

1.5.5 Main Contractor

The MC is responsible for the implementation and compliance with recommendations and conditions set out in the EMPr. This requires that the MC be familiar with the EIA report, EA conditions and the EMPr. This encompasses the following activities:

- Ensuring compliance with the EMPr at all times during construction;
 - Ensuring that all subcontractors have a copy of and understand the contents of the EMPr, to ensure environmental best practice.
- Preventing pollution and avoid actions that will impact or harm the surrounding environment;
- Responsible for the construction activities to be carried out for the duration of the project (with subcontractors and contract workers);
- Implementing corrective and preventive actions, where required;
- Maintain an environmental register which keeps a record of all incidents which occur on the site during construction. These incidents include:
 - Public involvement / complaints;
 - Health and safety incidents;
 - Hazardous materials stored on site; and
 - Non-compliance incidents.
- Development of specific method statements prior to commencement of environmentally sensitive constructions activities as identified in the EMPr.

1.5.6 Environmental Control Officer

The ECO is responsible for the implementation of the EMPr during the construction phase and liaison between the Contractor and the Landowners. The ECO should have a relevant environmental degree or relevant tertiary qualification. The ECO is also to be an independent party. The ECO will liaise and report

to the Contractor and authorities, thus the ECO should have effective communication and negotiating skills. The following tasks will fall within his / her responsibilities:

- Be aware of the findings and conclusions of the Environmental Impact Assessment and the conditions stated within the EAs.
- Work with the construction team to review relevant risk/ method statements from an environmental perspective;
- Be familiar with the recommendations and mitigation measures of this EMPr;
- Conduct monthly audits of the construction site according to the EMPr and EAs. A monthly report will be produced detailing the findings of the audit highlighting any non-compliance issues. Positive compliance with the EMPr will also be noted;
- Educate the construction team about the management measures of the EMPr and EAs.
- Regular liaison with the construction team and the project leader;
- Recommend corrective action for any environmental non-compliance incidents on the construction site;
- The affected parties shall always be kept informed about any changes to the construction programme should they be involved. If the ECO is not on site the Contractor should keep the affected parties informed. The contact numbers of the Contractor and the ECO shall be made available to the affected parties. This will ensure open channels of communication and prompt response to queries and claims; and
- Liaising with the heritage specialist in the case of unearthing of artefacts and/ or graves.

The ECO is responsible for providing an independent evaluation of compliance with the EMPr and not for enforcement of conditions of the EMPr. The Project Company is responsible for enforcement of the conditions of the EMPr.

The Contractor and the EO are accountable to the ECO for non-compliance with the EMPr. The ECO provides feedback to the Project Company and I&APs, as required. Issues of non-compliance raised by the ECO must be taken up by the Project Company's Representative and resolved with the Contractor as per the conditions of his/her contract.

The ECO will remain employed for the full duration of the contract until all snag items have been resolved, rehabilitation measures have been completed, and the site is handed over to the Operator, thereby indicating the start of the operational phase.

1.5.7 Environmental Officer

The EO must be appointed by the Contractor and is responsible for managing the daily onsite implementation of the EMPr, and for the compilation of weekly environmental monitoring reports. In addition, the EO must act as liaison and advisor on all environmental and related issues, seek advice from

the ECO when necessary, and ensure that any complaints received from I&APs are duly processed and addressed and that conflicts are resolved in an acceptable manner and timely manner. The EO shall be full time dedicated member of the Contractor's team and must be approved by the Project Company.

The following qualifications, qualities and experience are recommended for the individual appointed as the EO:

- A relevant environmental diploma or degree in natural sciences, as well as a minimum of three years' experience in construction site monitoring, excluding health and safety;
- A level-headed and firm person with above-average communication and negotiating skills. The ability to handle and address conflict management situations will be an advantage; and
- Relevant experience in environmental site management and EMPr compliance monitoring.

The EO's responsibilities include:

- Monitoring, on a daily basis, environmental specifications on site and compliance with the conditions of the EA, environmental legislation and EMPr;
- Keeping a register of compliance / non-compliance with the environmental specifications;
- Identifying and assessing previously unforeseen, actual or potential impacts on the environment;
- Ensuring that a brief weekly environmental monitoring report is submitted to the ECO;
- Conducting site inspections during the defects liability period, and bringing any environmental concerns to the attention of the ECO and Contractor;
- Advising the Contractor on the rectification of any pollution, contamination or damage to the construction site, rights of way and adjacent land;
- Attending site meetings (scheduled and *ad hoc*);
- Presenting the environmental awareness training course to all staff, Contractors and Sub contractors, and monitoring the environmental awareness training for all new personnel on-site, as undertaken by the Contractor;
- Ensuring that a copy of the EA and the latest version of the EMPr are available on site at all times;
- Ensuring that the Contractor is made aware of all applicable changes to the EMPr that are approved by the DEA;
- Assisting the Contractor in drafting environmental method statements and/or the Environmental Policy where such knowledge/expertise is lacking;
- Undertaking daily environmental monitoring to ensure the Contractor's activities do not impact upon the receiving environment. Such monitoring shall include dust, noise and water monitoring; and
- Maintaining the following on site:
 - A weekly site diary.
 - A non-conformance register.
 - An I&Ap communications register, and
 - A register of audits.

The EO will remain employed until all rehabilitation measures, as required for implementation due to construction damage, are completed and the site is handed over to the Operator.

1.5.8 *Community Liaison Officer*

The CLO shall be employed by the Contractor and will be responsible for managing the daily on-site implementation of the social aspects of the EMPr. The CLO shall liaise with landowners and relevant I&APs regarding construction activities for the duration of construction and will ensure that any discussions and complaints received from the public are addressed and that conflicts are resolved in an acceptable manner within 10 days.

The CLO(s) shall be full time dedicated member(s) of the Contractor's team and must be accepted by the Project Company. The CLO shall report to the Contractor's Project Manager, seeking advice from the ECO when necessary.

The CLO may be the same person as the EO, but will assume all the responsibilities of the dual roll.

The following qualifications, qualities and experience are recommended for the individual appointed as the Contractor's CLO:

- A person with communication and negotiating skills;
- Report writing skills; and
- Fluency in English, Afrikaans and any other local language as and where required.

The responsibilities and functions of the Construction CLO will include:

- Implement and manage the daily social and communication aspects of the construction process according to the EMPr;
- Liaise and maintain good relations with I&APs;
- Monitor social aspects in terms of the specifications;
- Implement mitigation and corrective measures;
- Submit a monthly environmental report to the Contractor's Project Manager;
- Conduct site inspections during the defects notification period, and bring any social concerns to the attention of the Contractor;
- Attend site meetings (scheduled and ad hoc);
- Maintain a filing system meeting the project's quality management plan;
- Assist the Contractor in the drafting of social methods statements where such knowledge/expertise is lacking;
- Maintain the following on site:
 - A daily site diary;
 - A public complaints and communications register; and
 - A register of audits.

- Remain employed until the end of construction.

1.5.9 Responsible Parties and Auditing Process

As described above, **Table 3** below provides a summary of the responsible parties and the auditing process to be carried out.

Table 3: Responsible Parties and Auditing Process

TITLE	PARTY	ROLE DURING CONSTRUCTION	ROLE DURING OPERATION
Project Company	Special Purpose Vehicle (SPV) to be confirmed once registered	Assume ultimate responsibility	Assume ultimate responsibility
Project Manager	To be appointed by proponent	Construction management	N/A
Contractor's Project Manager	Balance of Plant Contractor	Project management	N/A
Main Contractor/s	There will be multiple contracts placed and managed by the Contractor's Project Manager for the construction phase. These will cover civil earthworks and concrete, structural mechanical and electrical / instrumentation (CI). Then there could also be the construction camp management contract.	Main Contractor will undertake day to day construction activities covering aspects such as civil earthworks and concrete, structural mechanical and electrical / instrumentation (CI).	N/A
Environmental Officer	To be appointed by Main Contractors	Day to day environmental responsibility, point of contact for ECO	N/A
Environmental Control Officer	To be appointed by proponent	Monthly audits	Annual audits
Community Liaison Officer	To be appointed by Main Contractors	Day to day contact for landowners and I&APs	Monthly Audits
Determining Authority	National Department of Environmental Affairs (DEA)	Conduct site visits when necessary.	Conduct site visits when necessary

The following are the environmental management responsibilities (**Table 4**) of the various parties during construction and operational phases. Unless otherwise stated, the EMPr will be adhered to as follows:

- The EO will be the responsible party for all daily compliance of this EMPr during the construction phase;
- The monitoring party will be the ECO;
- Method of record keeping will be monthly audits undertaken by the ECO;
- Audit Technique will be the review of records and documentation (including EMPr/EA) that will be kept on site by the EO and/ or site inspections; and
- The Project Company will bear ultimate responsibility.

Table 4: Environmental Management Responsibilities

ITEM	PROJECT COMPONENT AND ACTIVITY	RESPONSIBLE PARTY	MONITORING PARTY	AUDIT TECHNIQUE
1.1	PRE-CONSTRUCTION (SITE ESTABLISHMENT)			
1.1.1	Site preparation	PROJECT COMPANY, MC, EO, ECO	PROJECT COMPANY, ECO	SITE VISIT
1.1.2	Consultation	MC, CLO	EO, ECO	SITE VISIT
1.1.3	Cumulative impacts	MC,	EO, ECO	SITE VISIT
1.1.4	Social and Environmental Management Systems	MC,	EO, ECO	SITE VISIT
2.1	CONSTRUCTION ACTIVITIES			
2.1.1	Site Clearing	MC,	EO, ECO	SITE VISIT
2.1.2	Construction traffic and access	MC, EO	ECO	SITE VISIT
2.1.3	Construction Camp	MC, EO, ECO	ECO	SITE VISIT
2.1.4	Environmental Education and Training	PROJECT COMPANY, MC	PROJECT COMPANY, ECO	SITE VISIT
2.1.5	Soils and Geology	MC, EO	ECO	SITE VISIT
2.1.6	Erosion Control	EO	ECO	SITE VISIT
2.1.7	Water Use and Quality	EO	ECO	SITE VISIT
2.1.8	Surface and Groundwater	EO	ECO	RECORDS REVIEW
2.1.9	Waste Management	EO	ECO	SITE VISIT
2.1.10	Flora	EO	ECO	SITE VISIT
2.1.11	Fauna	EO	ECO	RECORDS REVIEW, SITE VISIT
2.1.12	Air Quality	EO	ECO	RECORDS REVIEW

2.1.13	Noise and Vibrations	EO	ECO	RECORDS REVIEW
2.1.14	Energy use	EO	ECO	RECORDS REVIEW
2.1.15	Climate Change	EO	ECO	RECORDS REVIEW
2.1.16	Agricultural Potential	EO	ECO	RECORDS REVIEW
2.1.17	Employment	PROJECT COMPANY, MC	ECO	RECORDS REVIEW
2.1.18	Occupational Health and Safety	MC, EO	CLO	SITE VISIT
2.1.19	Health and Safety	MC, EO	HEALTH AND SAFETY OFFICER	SITE VISIT
2.1.20	Security	MC, EO	ECO	SITE VISIT
2.1.21	Social Environment	PROJECT COMPANY, MC, CLO	ECO	RECORDS REVIEW, SITE VISIT
2.1.22	Community Engagement	CLO	ECO	SITE VISIT
2.1.23	Visual Impact	EO	ECO	SITE VISIT
2.1.24	Heritage Impact	PROJECT COMPANY, MC, EO	ECO	SITE VISIT
2.1.25	Avifauna Impact	PROJECT COMPANY, MC, EO	ECO	SITE VISIT
3.1	OPERATION ACTIVITIES			
3.1.1	Construction Decommissioning	PROJECT COMPANY	ECO	RECORDS REVIEW
3.1.2	Operation and Maintenance	PROJECT COMPANY	ECO	RECORDS REVIEW
3.1.3	Surface and Groundwater	PROJECT COMPANY	ECO	RECORDS REVIEW
3.1.6	Pollution Control	PROJECT COMPANY	ECO	RECORDS REVIEW
3.1.7	Biodiversity	PROJECT COMPANY	ECO	RECORDS REVIEW
3.1.8	Waste Management	PROJECT COMPANY	ECO	RECORDS REVIEW
3.1.9	Health and Safety	PROJECT COMPANY	ECO	RECORDS REVIEW
3.1.10	Visual Impact	PROJECT COMPANY	ECO	RECORDS REVIEW

3.1.11	Avifauna Impact	PROJECT COMPANY	ECO	RECORDS REVIEW AND SITE VISIT
4.1	DECOMMISSIONING ACTIVITIES OF PROPOSED DEVELOPMENT			
4.1.1	Ongoing Stakeholder involvement	PROJECT COMPANY, CLO	PROJECT COMPANY	SITE VISIT
4.1.2	Community health and safety	PROJECT COMPANY, CLO	PROJECT COMPANY	RECORDS REVIEW
4.1.3	Waste management	PROJECT COMPANY, EO	PROJECT COMPANY, ECO	RECORDS REVIEW AND SITE VISIT
4.1.4	Surface and groundwater	PROJECT COMPANY, EO	PROJECT COMPANY, ECO	RECORDS REVIEW AND SITE VISIT
4.1.5	Biodiversity	PROJECT COMPANY, EO	PROJECT COMPANY, ECO	RECORDS REVIEW AND SITE VISIT
4.1.6	Air quality	PROJECT COMPANY, EO	PROJECT COMPANY, ECO	RECORDS REVIEW AND SITE VISIT

1.5.10 Environmental Audits

Table 5 below provides an outline of the generic process involved in the auditing process. It briefly describes the activities of the process initially beginning with defining the objectives and scope of the auditing process as well as the responsibilities of the various parties. The procedure for the auditing process is explained through to the production of audit findings and the compliance (or non-compliance) of the audit findings.

Table 5: Example of Procedure for Conducting Audits

Objective	To ensure that formal audits of the EMPr are scheduled and performed so as to verify compliance with the requirements of the EMPr.
Scope	This procedure describes the sequence of events required to perform a compliance audit and the verification of implemented corrective action.
Responsibilities	The Project Company is responsible for the maintenance of the Environmental Audit System as part of the Environmental Management System (EMS). The ECO will audit the effectiveness of the EMS yearly. The ECO is responsible for the scheduling and execution of the audit, as well as the verification of the implementation of corrective action. At his/her

	<p>discretion, this authority may be delegated to responsible company personnel or to an independent Environmental Auditing Authority to perform the audit on his/her behalf.</p> <p>Auditors shall have no direct responsibility in the area/ system being audited.</p> <p>They will be trained in techniques for auditing environmental management systems.</p> <p>The head of department (HOD)/ supervisor for an area/system to be audited (or a responsible person nominated by him/ her) will assist the audit team in the execution of the audit. The HOD will also be responsible for timely corrective actions based on the findings of the audit.</p>
Planning the audit	<p>The ECO or his authorised delegate, shall plan the audit of a particular environmental area or system as follows:</p> <ul style="list-style-type: none"> ▪ He shall inform, in writing, the contractor to be audited of the intention to conduct an audit at least two weeks prior to the audit. This notification should include the audit objective, scope and duration and any assistance required from the contractor. ▪ On completion of the audit, an audit findings report shall be prepared and submitted to the Project Company, project manager and construction team. ▪ Corrective actions shall be implemented, within four weeks after the audit, where possible.
Audit Check List	<p>Auditing will be performed by collecting evidence for verification through interviews, relevant documentation and observation of activities and conditions. Instances of non-conformity to EMP criteria should be recorded. An environmental audit checklist can be used as a guide to address all relevant issues.</p>
Audit Compliance	<p>See below.</p>
Audit Findings and Reporting of non-compliances	<p>The audit team shall review all evidence of their audit findings to decide on non-compliance. Audit findings of non-compliance must be documented and supported by evidence in the Audit Findings Report.</p> <p>The non-compliance findings will be communicated to the Project Manager and his representatives during an audit feedback meeting.</p>

1.6 Layout of Environmental Management Programme

1.6.1 Introduction

This EMPr addresses both generic issues as well as specific issues. The generic and specific issues are each separated into different phases. Each phase has specific issues unique to that period of the development and operation of the wind energy facility as well as associated infrastructure. The impact is identified and given a brief description. The phases of the development are then identified as below:

- Pre-construction (Site Establishment)
- Construction (including associated rehabilitation of affected environment)
- Operation Phase
- Decommissioning

This EMPr seeks to manage and keep to a minimum the negative impacts of a development and at the same time, enhance the positive and beneficial impacts.

The EMPr specifies mitigation measures for the following environmental aspects:

1.6.2 Pre-construction (Site establishment)

- Site preparation
- Consultation
- Site clearing
- Social and Environmental Management Systems

1.6.3 Construction

- Construction Camp
- Construction Traffic and Access
- Environmental Education and Training
- Soils and Geology
- Erosion Control
- Water Use and Quality
- Surface and Groundwater
- Waste Management
- Flora
- Fauna
- Air Quality

- Noise and Vibrations
- Energy Use
- Employment
- Occupational Health and Safety
- Security
- Social Environment
- Cultural and Heritage Artefacts
- Community Engagement
- Visual Impact

1.6.4 *Operation*

- Construction Site Decommissioning
- Operation and Maintenance
- Surface and Groundwater
- Biodiversity
- Waste Management
- Health and Safety
- Visual Impact
- Avifauna
- Social

1.6.5 *Decommissioning Phase*

- Ongoing Stakeholder involvement
- Community health and safety
- Waste Management
- Surface and Groundwater
- Biodiversity
- Air Pollution

1.7 Objectives of an EMPr

The objectives of this EMPr are to:

- Identify a range of mitigation measures which could reduce and mitigate the potential impacts to minimal or insignificant levels
- To identify measures that could optimise beneficial impacts
- To create management structures that address the concerns and complaints of I&APs with regards to the development
- To establish a method of monitoring and auditing environmental management practices during all phases of development
- Ensure that the construction and operational phases of the project continues within the principles of Integrated Environmental Management and EMS ISO 14001 Principles
- Detail specific actions deemed necessary to assist in mitigating the environmental impact of the project.
- Ensure that the safety recommendations are complied with.
- Propose mechanisms for monitoring compliance with the EMPr and reporting thereon.
- Specify time periods within which the measures contemplated in the EMPr are implemented, where appropriate.

The EMPr Seeks to highlight the following:

- Avoiding impacts by not performing certain actions
- Minimising impacts by limiting aspects of an action
- Rectifying impacts through rehabilitation, restoration, etc. of the affected environment
- Compensating for impacts by providing substitute resources or environments
- Minimising impacts by optimising processes, structural elements and other design features
- Provide ongoing monitoring and management of environmental impacts of a development and documenting of any digressions /good performances
- The EMPr is a legally binding document that all parties involved in the project must be made aware of.

1.7.1 *Environmental monitoring*

A monitoring programme will be implemented for the duration of the lifecycle of proposed development. This programme will include:

- **Monthly Audits During the Construction Phase**
 - According to the EMPr conditions which will be conducted by the ECO. These audits can be conducted randomly and do not require prior arrangement with the project manager.
 - Compilation of an audit report with a rating of the compliance with the EMPr. This report will be submitted to the relevant authorities.
- **Annual Audits During the Operational Phase**
 - Undertaken by the ECO.

The ECO shall keep a photographic record of any damage to areas outside the demarcated site area. The date, time of damage, type of damage and reason for the damage shall be recorded in full to ensure the responsible party is held liable. All claims for compensation emanating from damage should be directed to the ECO for appraisal. A register shall be kept of all complaints from the landowner or community (Annexure A). All complaints / claims shall be handled immediately to ensure timeous rectification / payment by the responsible party.

A copy of the EMPr must be kept on site during the life of the wind energy facility. The EMPr will be made binding on all contractors operating on the site and must be included within the Contractual Clauses. Those responsible for environmental damage must pay the repair costs both to the environment and human health and the preventative measures to reduce or prevent further pollution and/or environmental damage (the polluter pays principle).

1.8 Applicable Legislation, Development Strategies and Guidelines

The following legislation applies:

- Constitution of South Africa (Act No. 108 of 1996)
- National Environmental Management Act (Act No 107 of 1998) – NEMA
- Environment Conservation Act (Act No 73 of 1989)
- National Heritage Resources Act (Act No 25 of 1999)
- National Water Act (Act No 36 of 1998)
- National Environmental Management: Biodiversity (Act No. 10 of 2004)
- National Forests Act, 1998 (Act No. 84 of 1998)
- Conservation of Agricultural Resources Act No. 43 of 1983)
- Subdivision of Agricultural Land (Act No. 70 of 1970, as amended)
- National Road Traffic (Act No. 93 of 1996, as amended)
- Civil Aviation Act (Act No.13 of 2009)
- Occupational Health and Safety Act No. 85 of 1993
- National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004)
- National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)
- Development Facilitation Act No. 67 of 1995
- National Protected Areas Act (Act No. 25 of 2003)

Several regulations will be applicable to the construction phase of the project. These guidelines are mentioned in the EMPr tables. Also of significance in this EMPr are:

- World Bank International Finance Corporation (IFC),
- EHS Guidelines and
- Equator Principles

1.8.1 The Equator Principles

The Equator Principles (2013) are a financial industry benchmark for determining, assessing and managing social & environmental risk in project financing. A number of banks, exchanges and organisations worldwide have adopted the Principles as requirements to be undertaken for project funding on application and approval. Furthermore, certain funding institutions have not formally adopted the Principles, but require clients to be compliant with them in order to qualify for loans.

Under Principle 3, the Equator Principles establish the International Finance Corporations (IFC) Performance Standards and associated General and Sector Specific Environmental, Health and Safety Guidelines as the applicable social and environmental standards that a project should comply with if the project is located in a non-OECD country or OECD country that is not designated as high income.

The social and environmental assessment that is undertaken for a project establishes whether or not the project is in compliance with the IFC Performance Standards¹.

According to these principles, the performance standards relevant to the proposed development are summarised in **Table 6**.

Table 6: IFC Performance Standards

Performance Standard	Intent and objective
Assessment and Management of Environmental and Social Risks and Impacts (1)	<ul style="list-style-type: none">▪ Adverse and beneficial impacts should be identified within the projects Area of Influence. Emphasis on integrated assessment of social and environmental impacts.▪ Compliance with national legislation and IFC PS and EHS guidelines as appropriate.▪ Emphasis on avoidance of impacts wherever practical and where this is not feasible, minimizes, mitigate and compensate.▪ To ensure effective and ongoing stakeholder engagement▪ To assess specifically the capacity and commitment of clients to manage risks and opportunities over the course of the transaction.
Labour and Working Conditions (2)	<ul style="list-style-type: none">▪ Looks at the working conditions by following these principles;▪ To establish and maintain the worker- management relationship (including specifically a human resources policy).▪ To promote fair treatment, non-discrimination and equal opportunity of employees (and some contractors) and meet national employment laws.

¹ **NB** A project does not seek compliance with the Equator Principles per se but the standards that the EP refers to. A financial institution that has adopted the EP must ensure that any projects it is financing meet the standards referred to and that it adopts an appropriate risk management system to ensure this.

	<ul style="list-style-type: none"> ▪ To protect the workforce by addressing child labour and forced labour. ▪ To promote healthy and safe working conditions.
Resource Efficiency and Pollution Prevention (3)	<ul style="list-style-type: none"> ▪ To avoid and minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities. ▪ To promote the reduction of emissions that contributes to climate change.
Community Health Safety and Security (4)	<ul style="list-style-type: none"> ▪ To avoid or minimise risks to and impacts on the health and safety of the local community during the project life cycle from both routine and non-routine circumstances. ▪ To ensure that the use of security personnel is carried out in a legitimate manner that avoids or minimizes risks to the community's safety and security.
Land Acquisition and Involuntary Resettlement (5)	<ul style="list-style-type: none"> ▪ To avoid or at least minimize involuntary resettlement wherever feasible by exploring alternative project designs. ▪ To mitigate adverse social and economic impacts from land acquisition or restrictions on affected persons' use of land by; (i) providing compensation for loss of assets at replacement cost, and (ii) ensuring that resettlement activities are implemented with appropriate disclosure of information, consultation, and the informed participation of those affected. ▪ To improve or at least restore the livelihoods and standards of living of displaced persons. ▪ To improve living conditions among displaced persons through provision of adequate housing with security of tenure at resettlement sites.
Biodiversity Conservation and Sustainable Management of Living Natural Resources (6)	<ul style="list-style-type: none"> ▪ To promote and conserve biodiversity. ▪ To avoid the introduction of alien invasive species. ▪ To promote sustainable management and use of natural resources (NRM).
Indigenous People (7)	<ul style="list-style-type: none"> ▪ To foster full respect for the dignity, human rights, aspirations, cultures and natural resource-based livelihoods of Indigenous Peoples (IP). ▪ To avoid impacts or where avoidance is not feasible, minimize, mitigate and compensate in a culturally appropriate fashion and within the framework of successful good faith negotiation (a form of stakeholder engagement requiring approval of both parties). ▪ To establish and maintain effective relationships with IPs over the course of the project.

Cultural Heritage (8)	<ul style="list-style-type: none">▪ To protect cultural heritage from adverse impacts of project activities and support its preservation.▪ To promote the equitable sharing of benefits from the use of cultural heritage in business activities.
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(Source; IFC Guidelines, 2012)

2 ENVIRONMENTAL DOCUMENTATION, REPORTING AND COMPLIANCE

2.1 Documentation

The Contractor must ensure the following documentation is kept on the project site for the full duration of the contract:

- Final Environmental Management Programme once approved by the DEA;
- EA issued by the DEA;
- Environmental Policy of the Contractor;
- Environmental method statements compiled by the Contractor;
- Weekly environmental monitoring records;
- Minutes and record of attendance of all environmental meetings;
- Environmental incident book;
- Communications register;
- Register of audits;
- Non-conformance reports; and
- Waste manifests.

2.1.1 *Weekly Environmental Monitoring Report*

The EO will be required to provide the Main Contractor with a brief weekly environmental monitoring report covering the onsite events which occurred during the past week. This will highlight key performance areas and provide feedback on corrective and preventive actions taken. The EO will have the weekly reports submitted by the Contractor's Manager prior to submission to The Project Company for monthly reporting.

2.1.2 *Site Meetings*

Weekly site meetings are undertaken which include environmental matters. This meeting shall be chaired by a Senior Site Representative with the Project Company, Contractor(s), the EO ('s), and CLO ('s) in attendance. Where practical or necessary, the ECO will need to attend if possible.

2.1.3 Method Statements

It is a statutory requirement to ensure the wellbeing of employees and of the environment. Therefore, the Contractor shall submit a Method Statement to the Project Company and the ECO for approval prior to the commencement of construction works.

A Method Statement is a document detailing how a particular process will be carried out. It should detail the possible dangers/risks associated with the particular part of the project and the methods of control to be established and to show how the work will be managed in a safe and environmentally responsible manner. The method statement shall also include the following information, where applicable:

- The type of construction activity;
- Timing and location of the activity;
- Construction procedures;
- Materials and equipment to be used;
- Transportation of the equipment to and from site;
- How the equipment/material will be moved while on site;
- Location and extent of construction site office and storage areas;
- Identification of impacts that might result from the construction activity;
- Population impacts;
- Community/institutional arrangements;
- Conflicts between local residents and newcomers;
- Individual and family level impacts;
- Community infrastructure needs;
- Intrusion impacts;
- Methodology and/or specifications for impact prevention or containment and for environmental monitoring;
- Emergency/disaster incident and reaction procedures (required to be demonstrated); and
- Rehabilitation procedures and continued maintenance of the impacted environment.

The Contractor will be accountable for all actions taken in non-compliance of the approved method statements. The Contractor shall keep all the method statements and subsequent revisions on file, copies of which must be distributed to all relevant personnel for implementation.

The Contractor will be required to submit, as a minimum, the relevant method statements as requested by the ECO which are to be compliant with the conditions of the EMPr for review prior to the start of that specific activity.

2.1.4 *Communications Register*

All complaints or communications that are received from I&APs or any other stakeholder must be recorded in a communications register. These complaints and communications will be brought to the attention of the Project Company, whereupon it will be investigated and a response to the Complainant, I&APs or stakeholder will be given within 10 days. The communications register shall include the following information:

- Record the time and date of the complaint/communication;
- A detailed description of the complaint/communication;
- Action and resources used to correct the complaint;
- Photographic evidence of the complaint (where possible);
- A written response to the complainant indicating rectification of the complaint; and
- Information regarding the relevant authority that was contacted or notified in writing where applicable (person, time and date).

The relevant authorities include:

- Department of Water and Sanitation (e.g. for any incidents involving the contamination of water resources).
- DEA (e.g. for any significant incident of pollution of the soil and air).
- Department of Agriculture, Forestry and Fisheries (e.g. uses of appropriate herbicides for eradication of alien invasive species, and permits for trees of special concern).
- Department of Health (e.g. for incidents such as contamination of water resources, accidental spill of hazardous substances).
- Department of Transport (e.g. for the diversion of traffic due to construction activities).
- Department of Labour (e.g. for labour disputes).

2.1.5 *Photographic Record*

The EO and ECO will be required to compile a photographic record (dated) of all activities on site prior to construction related activities starting, during the construction process and on completion of construction related works. This photographic record will include:

- A pre-construction site record
- Monthly environmental audit reports;
- Weekly environmental monitoring reports;
- Corrective action;
- Progress of environmental works; and
- Incidences of non-conformance.

2.1.6 Waste Manifests

The Contractor shall ensure that all solid (including any hazardous) waste removed from site is disposed of at a registered landfill site or nearby waste transfer station with capacity to accept the project generated waste. The waste manifest shall be kept on record for auditing purposes.

2.1.7 Good Housekeeping

The Contractor is to practice good housekeeping throughout the construction phase. This should eliminate disputes about responsibility, facilitate efficient and timeous running of the project. Over and above practicing accepted construction methods in accordance with SANS 10120, this should include measures to preserve the environment inside the work area. Records of such actions taken to ensure the maintenance and management of housekeeping must be recorded.

The Contractor shall record and report upon environmental management measures undertaken to mitigate assessed impacts upon the environment.

2.1.8 Management and Control

The Contractor is to implement environmental management in a reasonable manner and should such management not prove effective, shall implement measures to the satisfaction of the Project Company. Appropriate measures shall include:

- Appointment of necessary resources to monitor and manage environmental requirements;
- Implement aspect-specific method statements to deal with emergency situations;
- Provision of adequate emergency response equipment to mitigate and manage an incident or emergency; and
- Provision of specific training related to implementation of environmental management requirements.

2.1.9 Recording and Reporting

The Contractor shall maintain detailed records of parameters monitored. These detailed records shall demonstrate the effectiveness of the management actions implemented to mitigate potential impacts. The Contractor shall submit a monthly database/report of management works implemented to the Project Company, as part of the Contractors monthly report.

2.1.10 Monitoring

The Contractor shall submit an Environmental Monitoring Method Statement which details the scope, nature, process, schedule and templates for environmental monitoring. The monitoring results shall be used to determine the effectiveness of the management programme. All complaints, compliments or other

comments relating to environmental management parameters are to be recorded in the site issues register of the Contractor for inclusion in the project issues register held by the Project Company.

Monitoring results and the associated required management and mitigation actions for the coming monitoring period are to be presented in the monitoring section of the Contractors monthly report. The daily and weekly reports are to detail observations and information relating to requested management actions and their effectiveness.

The Contractor shall monitor and maintain the following on an ongoing basis:

- Re-growth of alien invasive vegetation;
- Validity of the pest control officer certificate;
- Fire break requirements associated to construction related activities;
- Stormwater systems;
- Topsoil and backfill volumes;
- Access road condition;
- Dust generated from stockpiles;
- Noise;
- Water quality;
- Erosion prevention; and
- Landscaping requirements for rehabilitation.

The Contractor shall submit a monthly database of inter alia the following works to the ECO. This data base is to include as a minimum:

- Extent of alien invasive clearing operations;
- Volumes of herbicide used on the project;
- Stockpile volumes of chipped material, topsoil, fertile soil and subsoil;
- Volume of recyclable waste removed from site;
- Water volumes recycled and used for dust suppression; and
- Maintenance of chemical toilets.

All complaints, compliments or other comments relating to construction related works are to be recorded by the Contractor in the communications register of the receiving party for inclusion in the project issues register. Site clearance monitoring results and the associated required management and mitigation actions for the coming monitoring period are to be presented in the monitoring section of the Contractors monthly report. The weekly report are to detail observations and information relating to requested management actions and their effectiveness.

2.2 Compliance with the EMPr

The Contractor/s is/are deemed not to have complied with the EMPr if:

- Within the boundaries of the site, site extensions and access roads there is evidence of contravention of clauses;
- If environmental damage ensues due to negligence;
- The contractor fails to comply with corrective or other instructions issued by the ECO or Authorities within a specified time; and
- The Contractor fails to respond adequately to complaints from the public.

The Project Company is deemed not to have complied with the EMPr if:

- Within the boundaries of the site there is evidence of contravention of clauses;
- If environmental damage ensues due to negligence; and
- They fail to respond adequately to complaints from the public.

2.2.1 Non-Conformance Report

A Non-Conformance Report (NCR) will be issued to the Contractor as a final step towards rectifying a failure in complying with a requirement of the EMPr. This will be issued to the Contractor in writing. Preceding the issuing of the NCR, the Contractor will be presented with an opportunity to rectify the outstanding issue in a timely manner.

Preceding requirements to the submitting of the NCR will entail an issue that has been highlighted to the Contractor in the audits for corrective action. Should this issue not be corrected or completed to the satisfaction of the Project Company and ECO, the issue is escalated to an NCR.

Should the ECO assess an incident / issue and find it to be significant (e.g. non-repairable damage upon the environment), it will be reported to the DEA and immediately escalated to the level of an NCR. This will be done in consultation with the Project Company. The following information should be recorded in the NCR:

- Details of non-conformance;
- Any plant or equipment involved;
- Any chemicals or hazardous substances involved;
- Work procedures not followed;
- Any other physical aspects;
- Nature of the risk;
- Actions agreed to by all parties following consultation that should adequately address the identified non-conformance. This may take the form of specific control measures and should take the hierarchy of controls into account. This must accompany the NCR for filing purposes;
- The agreed timeframe by which the Contractor should have implemented the actions documented in the NCR; and
- The ECO should verify that the agreed actions have taken place on or soon after the agreed completion date. Where the actions are complete, the ECO and Contractor should sign the Close Out portion of the Non-Conformance Form and file it with the contract documentation.

2.2.2 Environmental Emergency Response

The Contractor's environmental emergency procedures must ensure that there will be an appropriate response to unexpected or accidental actions or incidents that could cause environmental impacts. Such incidents may include:

- Accidental discharges to water (i.e. into a water resource) and land;
- Accidental spillage of hazardous substances (typically oil, petrol, and diesel);
- Accidental toxic emissions into the air;
- Specific environmental and ecosystem effects from accidental releases or incidents;
- The Environmental Emergency Response Plan is separate to the Health and Safety Plan as it is aimed at responding to environmental incidents and must ensure and include the following:
 - Construction employees shall be adequately trained in terms of incidents and emergency situations;
 - Details of the organisation (manpower) and responsibilities, accountability and liability of personnel;
 - A list of key personnel and contact numbers;
 - Details of emergency services (e.g. the fire department, spill cleanup services) shall be listed;
 - Internal and external communication plans, including prescribed reporting procedures;
 - Actions to be taken in the event of different types of emergencies;
 - Incident recording, progress reporting and remediation measures to be implemented; and
 - Information on hazardous materials, including the potential impact associated with each, and measures to be taken in the event of accidental release.

The Contractor(s) will comply with the environmental emergency preparedness and incident and accident-reporting requirements, as required by the Occupational Health and Safety Act (Act No. 85 of 1993), the National Environmental Management Act (Act No. 107 of 1998), the National Water Act (Act No. 36 of 1998), and/or any other relevant legislation.

2.2.3 Non-compliance

Non-conformance will be issued to the Contractor for incidents of non-compliance. The Contractor (through the Environmental Officer) shall also take the necessary steps (e.g. training) to prevent a recurrence of the infringement. The Contractor is also advised that the imposition of non-conformance does not replace any legal proceedings the authorities, landowners and/or members of the public may institute against the Contractor. The Contractor shall be required to make good any damage caused as a result of the infringement at his own expense. A preliminary list of infringements for which non-conformance will be imposed is as follows:

- Using areas outside the working areas without permission/accessing “no-go areas”;
- Clearing and/or leveling area outside of the working areas;
- Littering on the site and surrounds;
- Burying/burning waste on site and surrounds;
- The undertaking of informal ablutions
- Making fires on site;
- Spillage onto the ground or water bodies of oil, diesel, or any other potential pollutants;
- Picking/damaging plant material, especially that from the residual areas of natural bush on the site;
- Damaging/killing wild or domestic animals/birds;
- Discharging effluent and/or stormwater onto the ground or into surface water;
- Repeated contravention of the specification or failure to comply with instruction;
- Mixing cement directly on soil or bare ground outside designated batching plant;
- Keeping animals as pets on site.

The Senior Site Supervisor, on recommendation from the ECO, may also order the Contractor to suspend part or all the works if the Contractor repeatedly causes damage to the environment by not adhering to the EMPr (i.e. more than 3 cases of infringements). The suspension will be enforced until such time as the offending actions, procedure or equipment is corrected. No extension of time will be granted for such delays and all costs will be borne by the Contractor.

2.2.3.1 Contractor performance

The Main Contractor must ensure that the conditions of the EMPr are adhered to. Should the Main Contractor require clarity on any aspect of the EMPr, the Main Contractor must contact the Environmental Control Officer for advice.

3 MITIGATION GUIDELINES

3.1 Introduction

Mitigation guidelines are addressed through four phases namely Pre-construction (Site Establishment) Phase; Construction Phase (and associated rehabilitation of affected environment); Operational Phase (Post-Construction) as well as De-commissioning Phase. Each phase has specific issues unique to that period of the development and operation of the wind energy facility and the associated infrastructure. The impact is identified and given a brief description. The four phases of the development and relevant requirements are identified below.

3.2 Pre-construction (Site Establishment)

Requirements for the pre-construction phase:

- Proper and continuous liaison between the ECO, the Contractor and Landowners to ensure all parties are appropriately informed at all times.
- The Contractor must adhere to all conditions of the contract including the Environmental Management Programme.
- Adequate planning of the construction programme to allow for disruptions due to rain and very wet conditions.
- Where existing private roads are in a bad state of repair, such roads' condition shall be documented before they are used for construction purposes. This will allow for easy assessment of any damage to the roads which may result from the construction process. If necessary some repairs should be done to prevent damage to equipment. All roads no matter what the condition need to be documented prior to construction.
- Proper documentation and record keeping of all complaints and actions taken.
- Appointment of an Environmental Control Officer to implement this EMP.
- Regular site inspections by the ECO and good control over the construction process throughout the construction period.
- Independent Environmental Audits to be carried out during and upon completion of construction. A formal communications protocol should be set up during the construction phase. The aim of the protocol should be to ensure that effective communication on key issues that may arise during this phase be maintained between key parties such as the ECO, project manager and contractor. The protocol should also ensure that concerns / issues raised by I&APs are formally recorded and considered and where necessary acted upon. If necessary, a forum for communicating with key stakeholders on a regular basis may need to be set up. This could be done through an Environmental Monitoring Committee that would meet on a regular basis. The communications protocol should be maintained throughout the construction phase.

3.3 Pre-Construction Phase

3.3.1 Site preparation

Table 7: Site preparation

IMPACT	SITE PREPARATION This section deals with the preparation of the site and actions that need to be implemented before construction commences	RESPONSIBILITY
PHASE	SITE ESTABLISHMENT	MC, EO, ECO
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	<p>Appoint construction team and suitable manager</p> <ol style="list-style-type: none"> 1. Appoint an Environmental Control Officer and Environmental Officer. The EO is from the contractor's side while the ECO is from the client's side. <p>Site demarcation and compliance</p> <ol style="list-style-type: none"> 2. Before construction begins, all areas to be developed must be clearly demarcated with fencing or orange construction barrier where applicable. 3. All Construction Camps are to be fenced off in such a manner that unlawful entry is prevented and access is controlled. Signage shall be erected at all access points in compliance with all applicable occupational health and safety requirements. All access points to the Construction Camp should be controlled by a guard or otherwise monitored, to prevent unlawful access. 4. The contractor and ECO must ensure compliance with conditions described in the EA. 5. Records of compliance/ non-compliance with the conditions of the authorisation must be kept and be available on request. 6. Records of all environmental incidents must be maintained and a copy of these records be made available to the national and provincial departments on request throughout the project execution. <p>Construction Camp</p>	

	<p>7. Site establishment shall take place in an orderly manner and all required amenities shall be installed at camp sites before the main workforce move onto site.</p> <p>8. All construction equipment must be stored within this construction camp.</p> <p>9. All associated oil changes etc. (no servicing) must take place within this camp over a sealed surface such as a concrete slab.</p> <p>10. An area for the storage of hazardous materials must be established that conforms to the relevant safety requirements and that provides for spillage prevention and containment.</p> <p>11. All Construction Camps shall be provided with portable fire extinguishing equipment, in accordance with all relevant legislation and must be readily accessible.</p> <p>12. The Contractor must provide sufficient ablution facilities, in the form of portable / VIP toilets, at the Construction Camps, and shall conform to all relevant health and safety standards and codes. No pit latrines, French drain systems or soak away systems shall be allowed and toilets may not be situated within 100 meters of any surface water body or 1:100 year flood line. A sufficient number of toilets shall be provided to accommodate the number of personnel working in the area.</p> <p>13. The Contractor shall inform all site staff to make use of supplied ablution facilities and under no circumstances shall indiscriminate sanitary activities be allowed.</p> <p>14. No fires will be allowed and the Contractor must make alternative arrangements for heating. LP Gas may be used, provided that all required safety measures are in place. The Contractor shall take specific measures to prevent the spread of veld fires, caused by activities at the campsites. These measures may include appropriate instruction of employees about fire risks.</p> <p>Labour</p> <p>15. All unskilled labourers for pre-site construction should be drawn from the local market and where possible use should be made of local semiskilled and skilled personnel.</p> <p>Training of site staff</p> <p>16. Environmental awareness training for construction staff, concerning the prevention of accidental spillage of hazardous chemicals and oil; pollution of water resources (both surface and groundwater), air pollution and litter control and identification of archaeological artefacts.</p> <p>17. Project Manager shall ensure that the training and capabilities of the Contractor's site staff are adequate to carry out the designated tasks.</p>	
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	<p>18. Staff operating equipment (such as loaders, etc.) shall be adequately trained and sensitised to any potential hazards associated with their tasks.</p> <p>19. No operator shall be permitted to operate critical items of mechanical equipment without having been trained by the Contractor and certified competent by the Project Manager.</p> <p>20. Staff should be educated as to the need to refrain from indiscriminate waste disposal and/or pollution of local soil and water resources and receive the necessary safety training.</p> <p>21. Staff must be trained in the hazards and required precautionary measures for dealing with these substances</p> <p>22. Spillage packs must be available at construction areas.</p> <p>Electromagnetic Interference Path Loss and Risk Assessment (SKA)</p> <p>23. To verify overall windfarm emissions, ambient measurements should be done at the new site before construction starts. Tests points should be carefully selected based on test equipment sensitivity with the objective to observe the increase in ambient emissions as construction progresses.</p>	
SPECIFIC MITIGATION MEASURES		
	<p>24. Pre-construction floral walk-through of the approved development footprint to ensure that sensitive habitats and species are avoided where possible.</p> <p>25. A large proportion of the impact of the development stems from the access roads and the number of roads should be reduced to the minimum possible and routes should also be adjusted to avoid areas of high sensitivity as far as possible, as informed by a preconstruction walk-through survey.</p> <p>26. Pre-construction environmental induction for all construction staff on site to ensure that basic environmental principles are adhered to. This includes topics such as no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, minimizing wildlife interactions, remaining within demarcated construction areas etc.</p> <p>27. Pre-construction faunal walk-through of the facility to identify areas of faunal sensitivity.</p> <p>28. A heritage walk-down of the final layout to determine if any significant sites will be affected.</p> <p>29. A walk down of the final approved layout will be required before construction commence; Any heritage features of significance identified during this walk down will require formal mitigation or where possible a slight change in design could accommodate such resources.</p>	

	<p>30. Any heritage features of significance identified during this walk down will require formal mitigation or where possible a slight change in design could accommodate such resources. A management plan for the heritage resources needs then to be compiled and approved for implementation during construction and operations.</p> <p>31. If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources are found during the proposed development, SAHRA APM Unit (Natasha Higgitt/Phillip Hine 021 462 5402) must be alerted. If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit (Thingahangwi Tshivhase/Mimi Seetelo 012 320 8490), must be alerted immediately. A professional archaeologist or palaeontologist, depending on the nature of the finds, must be contracted as soon as possible to inspect the findings. If the newly discovered heritage resources prove to be of archaeological or palaeontological significance, a Phase 2 rescue operation may be required subject to permits issued by SAHRA.</p> <p>32. Monitor find spots if construction is going to take place through them.</p> <p>33. A management plan for heritage resources needs to be compiled and approved for implementation during construction and operations.</p> <p>34. Avoid the historical farmstead at HBL001.</p> <p>35. The wetlands and drainage lines must be designated as “highly sensitive” and any impact must be limited to the minimum possible extent. All wetlands and drainage lines must be visibly demarcated prior to construction activities taking place where construction is within 50m of any delineated surface water resource. The demarcation of wetlands and drainage lines must be visible and last for the duration of the construction activities.</p> <p>36. A Traffic Management Plan must be prepared once the Project advances to the detailed design phase. This plan should ensure that vehicles arrive in a dispersed manner throughout the day to reduce the impact to other road users. The plan should also promote the use of car sharing, especially from Loeriesfontein and the construction camp. Methods to improve driver safety should also be outlined, e.g. the use of speed cameras or Average Speed Over Distance (ASOD) cameras along particular sections such as the R358 to Loeriesfontein.</p>	
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3.3.2 Consultation

Table 8: Consultation

IMPACT	CONSULTATION This section deals with the public consultation of the site and actions that need to be implemented before construction commences	RESPONSIBILITY
PHASE	PRE-CONSTRUCTION	MC, CLO
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	<p>Consultation</p> <ol style="list-style-type: none"> 1. Provide a mechanism through which information could be exchanged between the project proponent and stakeholders. 2. Identify relevant stakeholders and engage them at applicable stages of the construction process. 3. Inform the public about the proposed construction process. 4. Surrounding communities must be kept informed, through the identified and agreed consultation channels, of the commencement of construction. 5. Solicit views and concerns from the public and allow them to suggest mitigations and enhancement measures 6. Determine stakeholder satisfaction levels. 	

3.3.3 Site Clearing

Table 9: Site Clearing

IMPACT	SITE CLEARING This section deals with site clearing and actions that need to be implemented before construction commences	RESPONSIBILITY
PHASE	PRE-CONSTRUCTION	MC, EO, ECO
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	Site clearing <ol style="list-style-type: none"> 1. Site clearing must take place in a phased manner, as and when required. 2. Areas which are not to be constructed on within two months must not be cleared to reduce erosion risks. 3. The area to be cleared must be clearly demarcated and this footprint strictly maintained. 4. Spoil that is removed from the site must be removed to an approved spoil site or a licensed landfill site. 5. The necessary silt fences and erosion control measures must be implemented in areas where these risks are more prevalent. 	

3.3.4 *Social and Environmental Management Systems*

Table 10: Social and Environmental Management Systems

IMPACT	SOCIAL AND ENVIRONMENTAL MANAGEMENT SYSTEMS This section deals with the Social and Environmental Management Systems and actions that need to be implemented before construction commences	RESPONSIBILITY
PHASE	SITE ESTABLISHMENT	MC, PROJECT COMPANY
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	Social <ol style="list-style-type: none"> 1. Performance Standard One underscores the importance of managing social and environmental performance throughout the life of a project. 	

	<p>2. An effective social and environmental management system is a dynamic, continuous process initiated by management and involving communication between the client, its workers and the local communities directly affected by the project.</p> <p>3. The client will establish and maintain a Social and Environmental Management System, appropriate to the nature and scale of the project and commensurate to the level of social and environmental risks and impacts. The management system will incorporate the following elements:</p> <ul style="list-style-type: none"> ○ Social and Environmental Assessment ○ Management program ○ Organizational capacity ○ Training ○ Community Engagement ○ Monitoring and Reporting 	
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3.4 Construction Phase

3.4.1 Construction Camp

Table 11: Construction Camp

IMPACT	CONSTRUCTION CAMP This section deals with construction camp (equipment and batching camp) and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	CONSTRUCTION	MC / EO / ECO
ENVIRONMENTAL MANAGEMENT PROGRAMME		

<p>MITIGATION / METHOD STATEMENT</p>	<p>Site of construction camp</p> <ol style="list-style-type: none"> 1. Adequate parking must be provided for site staff and visitors. The Contractor must attend to drainage of the camp site to avoid standing water and / or sheet erosion. 2. Suitable control measures over the Contractor's yard, facility and material storage to mitigate any visual impact of the construction activity must be implemented. <p>Storage of materials (including hazardous materials)</p> <ol style="list-style-type: none"> 3. Choice of location for storage areas must take into account prevailing winds, distances to water bodies, general onsite topography and water erosion potential of the soil. Impervious surfaces must be provided where necessary. 4. Storage areas must be designated, demarcated and fenced if necessary. 5. Storage areas should be secure so as to minimize the risk of crime. They should also be safe from access by unauthorised persons i.e. children / animals etc. 6. Fire prevention facilities must be present at all storage facilities. 7. Proper storage facilities for the storage of oils, paints, grease, fuels, chemicals and any hazardous materials to be used must be provided to prevent the migration of spillage into the ground and groundwater regime around the temporary storage area(s). These pollution prevention measures for storage must include a bund wall high enough to contain at least 110% of any stored volume, and this must be sited away from drainage lines in a site with the approval of the Project Manager. The bund wall must be high enough to contain 110% of the total volume of the stored hazardous material with an additional allocation for potential stormwater events. 8. All fuel storage areas must be roofed to avoid creation of dirty stormwater. 9. These storage facilities (including any tanks) must be on an impermeable surface that is protected from the ingress of storm water from surrounding areas and that will not infiltrate into the ground in order to ensure that accidental spillage does not pollute local soil or water resources. 10. Material Safety Data Sheets (MSDSs) shall be readily available on site for all chemicals to be used on site. Where possible the available, MSDS's must additionally include information on ecological impacts and measures to minimise negative environmental impacts during accidental releases or escapes. 	
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	<p>11. Storage areas containing chemical substances / materials must be clearly sign posted.</p> <p>12. Staff dealing with these materials / substances must be aware of their potential impacts and follow the appropriate safety measures.</p> <p>13. All excess cement and concrete mixes are to be contained on the construction site prior to disposal off site.</p> <p>14. All major spills as specified in the contractor emergency response procedure of any materials, chemicals, fuels or other potentially hazardous or pollutant substances must be cleaned immediately and the cause of the spill investigated. Preventative measures must be identified and submitted to the MC and ECO for information. Emergency response procedures to be followed and implemented.</p> <p>Drainage of construction camp</p> <p>15. Surface drainage measures must be established in the Construction Camps so as to prevent</p> <ul style="list-style-type: none"> ▪ Ponding of water; ▪ Erosion as a result of accelerated runoff; and, ▪ Uncontrolled discharge of polluted runoff. 	
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3.4.2 Construction traffic and access

Table 12: Construction Traffic and Access

IMPACT	CONSTRUCTION TRAFFIC AND ACCESS This section deals with construction traffic and access and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	CONSTRUCTION	MC, EO, EO
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	<p>Construction traffic</p> <ol style="list-style-type: none"> 1. Construction routes and required access roads must be clearly defined. 2. A route study be undertaken as part of the final traffic transportation plan to confirm the most appropriate route to site. 3. Recommendations of the stormwater management plan must be implemented. 	

	<p>4. Access of all construction and material delivery vehicles should be strictly controlled, especially during wet weather to avoid compaction and damage to the topsoil structure.</p> <p>5. Damping down of the un-surfaced roads must be implemented to reduce dust and nuisance.</p> <p>6. Vehicles and equipment shall be serviced regularly to avoid the contamination of soil from oil and hydraulic fluid leaks etc.</p> <p>7. Servicing must be done in dedicated service areas on site or else off site if no such area exists.</p> <p>8. Oil changes must take place on a concrete platform and over a drip tray to avoid pollution.</p> <p>9. Soils compacted by construction shall be deep ripped to loosen compacted layers and re-graded to even running levels.</p> <p>Access</p> <p>10. The main routes on the site must be clearly sign posted and printed delivery maps must be issued to all suppliers and Sub-contractors.</p> <p>11. Planning of access routes to the site for construction purposes shall be done in conjunction with the Contractor and the Landowner. All agreements reached should be documented and no verbal agreements should be made. The Contractor shall clearly mark all access roads. Roads not to be used shall be marked with a "NO ENTRY for construction vehicles" sign.</p> <p>12. Access to the site must be via secondary roads as requested by SANRAL.</p> <p>Road maintenance</p> <p>13. Where necessary suitable measures shall be taken to rehabilitate damaged areas.</p> <p>14. Contractors should ensure that access roads are maintained in good condition by attending to potholes, corrugations and stormwater damages as soon as these develop.</p> <p>15. If necessary, staff must be employed to clean surfaced roads adjacent to construction sites where materials have spilt.</p> <p>16. Recommendations of the surface water report must be taken into consideration.</p> <p>General</p> <p>17. The contractor shall meet safety requirements under all circumstances. All equipment transported shall be clearly labelled as to their potential hazards according to specifications. All the required safety labelling on the containers and trucks used shall be in place.</p>	
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	<p>18. The Contractor shall ensure that all the necessary precautions against damage to the environment and injury to persons are taken.</p> <p>19. Care for the safety and security of community members crossing access roads should receive priority at all times.</p>	
SPECIFIC MITIGATION MEASURES		
	<p>20. All abnormal loads must be transport under a permit;</p> <p>21. A route study be undertaken to confirm the most appropriate route to site;</p> <p>22. Dust suppression techniques should be utilised to reduce the impact on air quality for the surrounding area;</p>	

3.4.3 Environmental Education and Training

Table 13: Environmental Education and Training

IMPACT	ENVIRONMENTAL EDUCATION AND TRAINING This section deals with the environmental training of construction employees who will work at the proposed energy facility	RESPONSIBILITY
PHASE	CONSTRUCTION	PROJECT COMPANY, PM, EO, ECO
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	<p>Environmental training</p> <p>1. The project company must appoint an ECO prior to construction.</p> <p>2. Ensure that all site personnel have a basic level of environmental awareness training. The ECO will be responsible for the training. Topics covered should include:</p> <ul style="list-style-type: none"> ▪ What is meant by “Environment” ▪ Why the environment needs to be protected and conserved ▪ How construction activities can impact on the environment ▪ What can be done to mitigate against such impacts 	

	<ul style="list-style-type: none"> ▪ Awareness of emergency and spills response provisions ▪ Social responsibility during construction e.g. being considerate to local residents <ol style="list-style-type: none"> 3. Training should be undertaken by a party such as the ECO who has sufficient expertise and knowledge of environmental issues. 4. It is the Contractor's responsibility to provide the site foreman with no less than 1 hour's environmental training and to ensure that the foreman has sufficient understanding to pass this information onto the construction staff. 5. Training should be provided to the staff members in the use of the appropriate fire-fighting equipment. Translators are to be used where necessary. 6. Use should be made of environmental awareness posters on site. 7. The need for a "clean site" policy also needs to be explained to the workers. 8. Staff operating equipment (such as loaders, etc.) shall be adequately trained and sensitized to any potential hazards associated with their tasks. <p>Monitoring of environmental training</p> <ol style="list-style-type: none"> 9. The Contractor must monitor the performance of construction workers to ensure that the points relayed during their introduction have been properly understood and are being followed. If necessary, the ECO and / or a translator should be called to the site to further explain aspects of environmental or social behaviour that are unclear. Toolbox talks are recommended. 	
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3.4.4 Soils and Geology

The general guidelines for management of soils, are provided in **Annexure B**.

Table 14: Soils and Geology

IMPACT	SOILS AND GEOLOGY This section deals with soils and geology and actions that need to be implemented during construction	RESPONSIBILITY

PHASE	CONSTRUCTION	MC, EO, ECO
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	<p>Topsoil</p> <ol style="list-style-type: none"> 1. The contractor should, prior to the commencement of earthworks determine the average depth of topsoil (if any), and agree on this with the ECO. The full depth of topsoil should be stripped from areas affected by construction and related activities prior to the commencement of foundations. This should include the building footprints, working areas and storage areas. Topsoil must be reused where possible to rehabilitate disturbed surface areas. 2. Care must be taken not to mix topsoil and subsoil during stripping. 3. Should any topsoil become polluted the contractor must remove the polluted soil to the full depth of pollution and replace it at his own expense with clean topsoil. 4. Removed polluted topsoil should be transported to a licensed landfill site. 5. The topsoil must be conserved on site in and round the pit area <p>Soil Stripping</p> <ol style="list-style-type: none"> 6. No soil stripping must take place on areas within the site that the contractor does not require for construction works or areas of retained vegetation. 7. Subsoil and overburden in all construction and lay down areas should be stockpiled separately to be returned for backfilling in the correct soil horizon order. 8. Construction vehicles must only be allowed to utilize existing tracks or pre-planned access routes. <p>Soil Stockpiles</p> <ol style="list-style-type: none"> 9. Stockpiles should not be situated such that they obstruct natural water pathways. 10. Stockpiles should not exceed 2m in height unless otherwise permitted by the Engineer. 11. If stockpiles are exposed to windy conditions or heavy rain, they should be covered either by vegetation or geofabric, depending on the duration of the project. Stockpiles may further be protected by the construction of berms or low brick walls around their bases. 12. Stockpiles should be kept clear of weeds and alien vegetation growth by regular weeding. 13. Where contamination of soil is expected, analysis must be done prior to disposal of soil to determine the appropriate disposal route. Proof from an approved waste disposal site where 	

	<p>contaminated soils are dumped if and when a spillage / leakage occurs should be attained and given to the project manager.</p> <p>Fuel storage</p> <p>14. Topsoil and subsoil to be protected from contamination. This should be monitored on a monthly basis by a visual inspection of diesel/oil spillage and pollution prevention facilities.</p> <p>15. Fuel and material storage must be away from stockpiles.</p> <p>16. Concrete and chemicals must be mixed on an impervious surface and provisions should be made to contain spillages or overflows into the soil.</p> <p>17. Any storage tanks containing hazardous materials must be placed in bunded containment areas with sealed surfaces. The bund walls must be high enough to contain 110% of the total volume of the stored hazardous material.</p> <p>Concrete mixing</p> <p>18. Should a concrete batching plant be required, it must be contained within a bunded area.</p> <p>19. Concrete mixing must only take place within designated areas.</p> <p>20. Ready mixed concrete must be utilised where possible.</p> <p>21. No vehicles transporting concrete to the site may be washed on site.</p> <p>22. If a batching plant is necessary, run-off should be managed effectively to avoid contamination of other areas of the site. Run-off from the batch plant must not be allowed to enter the storm water system.</p> <p>Earthworks</p> <p>23. Soils compacted during construction should be deeply ripped to loosen compacted layers and re-graded to even running levels. Topsoil should be re-spread over landscaped areas. According to specifications by a landscape architect, the area should be re-vegetated upon completion of construction activities.</p>	
SPECIFIC MITIGATION MEASURES		
	<p>Soils</p> <p>24. If an activity will mechanically disturb below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation.</p>	

	<p>25. Dispose of all subsurface spoils from excavations where they will not impact on undisturbed land.</p> <p>26. Minimize road footprint and control vehicle access on approved roads only.</p> <p>27. Control dust as per standard construction site measures which may include damping down with water or other appropriate and effective dust control measures. Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site.</p> <p>Geotechnical</p> <p>28. Material for construction purposes must where possible be sourced from site to reduce costs;</p> <p>29. Water should be stored on site so that it can be readily available for use.</p> <p>30. A detailed Geotechnical and Electrical investigation will be required.</p> <p>31. A detailed soil chemical analysis and soil resistivity test will also be required.</p>	
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3.4.5 Erosion Control

Table 15: Erosion Control

IMPACT	EROSION CONTROL This section deals with erosion and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	CONSTRUCTION	MC, EO, ECO
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	<ol style="list-style-type: none"> 1. Wind screening and stormwater control should be undertaken to prevent soil loss from the site. 2. The use of silt fences and sand bags must be implemented in areas that are susceptible to erosion. 3. Other erosion control measures that can be implemented are as follows: <ul style="list-style-type: none"> ▪ Brush packing with cleared vegetation ▪ Mulch or chip packing ▪ Planting of vegetation 	

	<ul style="list-style-type: none"> ▪ Hydroseeding / hand sowing <ol style="list-style-type: none"> 4. Sensitive areas need to be identified prior to construction so that the necessary precautions can be implemented. 5. All erosion control mechanisms need to be regularly maintained. 6. Seeding of topsoil and subsoil stockpiles to prevent wind and water erosion of soil surfaces. 7. Retention of vegetation where possible to avoid soil erosion 8. Vegetation clearance should be phased to ensure that the minimum area of soil is exposed to potential erosion at any one time. 9. Re-vegetation of disturbed surfaces should occur immediately after construction activities are completed. This should be done through seeding with indigenous grasses that were present on the site prior to construction. 10. No impediment to the natural water flow other than approved erosion control works is permitted. 11. To prevent stormwater damage, the increase in stormwater run-off resulting from construction activities must be estimated and the drainage system assessed accordingly. 12. Stockpiles not used in three (3) months after stripping must be seeded to prevent dust and erosion. 	
SPECIFIC MITIGATION MEASURES		
	<ol style="list-style-type: none"> 32. Implement an effective system of run-off control, where it is required, that collects and safely disseminates run-off water from all hardened surfaces and prevents potential down slope erosion. Any occurrences of erosion must be attended to immediately and the integrity of the erosion control system at that point must be amended to prevent further erosion from occurring there. This should be in place and maintained during all phases of the development. 33. Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize the soil against erosion. 34. Erosion must be controlled where necessary on topsoiled areas. 35. Erosion inspections will need to be undertaken regularly (as often as environmental compliance monitoring is undertaken by a suitably qualified Environmental Compliance Officer (ECO) during the construction phase, and monthly during the operation phase) in 	

	<p>order to manage the integrity of the temporary and permanent ford crossings. Additionally, rehabilitation will need to take place if and where required.</p> <p>36. Erosion management at the site should take place according to the Erosion Management Plan and Rehabilitation Plan.</p> <p>37. All erosion problems observed should be rectified as soon as possible, using the appropriate erosion control structures and re-vegetation techniques.</p>	
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3.4.6 Water Use and Quality

Table 16: Water Use and Quality

IMPACT	WATER USE AND QUALITY This section deals with water use and quality as well as actions that need to be implemented during construction	RESPONSIBILITY
PHASE	CONSTRUCTION	MC, ECO, EO, CLO
MITIGATION / METHOD STATEMENT	<p>Water Use</p> <ol style="list-style-type: none"> 1. Develop a sustainable water supply management plan to minimize the impact to natural systems by managing water use, avoiding depletion of aquifers and minimizing impacts to water users. 2. Water must be reused, recycled or treated where possible. 3. Consultation with key stakeholders to understand any conflicting water use demands and the community's dependency on water resources and conservation requirements within the area. <p>Water Quality</p> <ol style="list-style-type: none"> 4. The quality and quantity of effluent streams discharged to the environment including stormwater should be managed and treated to meet applicable effluent discharge guidelines. 5. Efficient oil and grease traps or sumps should be installed and maintained at refuelling facilities, workshops, fuel storage depots, and containment areas and spill kits should be available with emergency response plans. <p>Stormwater</p> <ol style="list-style-type: none"> 6. The site must be managed in order to prevent pollution of drains, downstream watercourses or groundwater, due to suspended solids and silt or chemical pollutants. 7. Silt fences should be used to prevent any soil entering the stormwater drains. 8. Temporary cut off drains and berms may be required to capture stormwater and promote infiltration. 9. Promote a water saving mind set with construction workers in order to ensure less water wastage. 	<p>Engineer</p> <p>ECO, MC</p> <p>Contractor</p>

	<p>10. New stormwater systems must be developed strictly according to specifications from engineers in order to ensure efficiency.</p> <p>11. Hazardous substances (fuel) must be stored at least 100m from any water bodies on site to avoid pollution.</p> <p>12. The installation of the stormwater system must take place as soon as possible to attenuate stormwater from the construction phase as well as the operation phase.</p> <p>13. Earth, stone and rubble is to be properly disposed of, or utilized on site so as not to obstruct natural water path ways over the site. I.e. these materials must not be placed in stormwater channels, drainage lines or rivers.</p> <p>14. There should be a periodic checking of the site's drainage system to ensure that the water flow is unobstructed.</p> <p>15. If a batching plant is necessary, run-off should be managed effectively to avoid contamination of other areas of the site. Untreated runoff from the batch plant must not be allowed to get into the storm water system or nearby streams, rivers or erosion channels or dongas.</p> <p>Sanitation</p> <p>16. Adequate sanitary facilities and ablutions must be provided for construction workers (1 toilet per every 15 workers).</p> <p>17. The facilities must be regularly serviced to reduce the risk of surface or groundwater pollution.</p> <p>Concrete mixing</p> <p>18. Concrete contaminated water must not enter soil or any natural drainage system as this disturbs the natural acidity of the soil and affects plant growth.</p> <p>Public areas</p> <p>19. Food preparation areas should be provided with adequate washing facilities and food refuse should be stored in sealed refuse bins which should be removed from site on a regular basis.</p> <p>20. The contractor should take steps to ensure that littering by construction workers does not occur and persons should be employed on site to collect litter from the site and immediate surroundings, including litter accumulating at fence lines.</p> <p>21. No washing or servicing of vehicles on site.</p>	
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3.4.7 Agriculture

Table 17: Agriculture

IMPACT	AGRICULTURE This section deals with issues relating to agricultural potential and resources and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	CONSTRUCTION	MC, ECO, EO
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	<p>Erosion</p> <ol style="list-style-type: none"> 1. Implement an effective system of run-off control, where it is required, that collects and safely disseminates run-off water from all hardened surfaces and prevents potential down slope erosion. Any occurrences of erosion must be attended to immediately and the integrity of the erosion control system at that point must be amended to prevent further erosion from occurring there. 2. Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize the soil against erosion. <p>Topsoil</p> <ol style="list-style-type: none"> 3. If an activity will mechanically disturb below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation. 4. Topsoil stockpiles must be conserved against losses through erosion by establishing vegetation cover on them. 5. Dispose of all subsurface spoils from excavations where they will not impact on undisturbed land. 6. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface. 7. Erosion must be controlled where necessary on topsoiled areas. 	

	<p>Veld Vegetation (Grazing)</p> <p>8. Minimize road footprint and control vehicle access on approved roads only.</p> <p>9. Control dust as per standard construction site practice.</p> <p>Air Quality</p> <p>10. Control dust as per standard construction site measures which may include damping down with water or other appropriate and effective dust control measures. Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site.</p> <p>Soil Contamination</p> <p>11. Implement effective spillage and waste management system.</p>	
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3.4.8 Surface and Groundwater

Table 18: Surface and Groundwater

IMPACT	SURFACE WATER AND GROUNDWATER	RESPONSIBILITY
	This section deals with surface and groundwater and actions that need to be implemented during construction	
PHASE	CONSTRUCTION	MC, ECO, EO
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	<p>Sanitation</p> <p>1. Adequate sanitary facilities and ablutions must be provided for construction workers (1 toilet per every 15 workers).</p> <p>2. The facilities must be regularly serviced to reduce the risk of surface or groundwater pollution.</p>	

	<p>Hazardous materials</p> <ol style="list-style-type: none"> 3. Use and or storage of materials, fuel and chemicals which could potentially leak into the ground must be controlled. 4. All storage tanks containing hazardous materials must be placed in bunded containment areas with sealed surfaces. The bund walls must be high enough to contain 110% of the total volume of the stored hazardous material. 5. Any hazardous substances must be stored at least 20m from any of the water bodies on site. 6. The Contractor (monitored by the ECO or EO) should be responsible for ensuring that potentially harmful materials are properly stored in a dry, secure, ventilated environment, with concrete or sealed flooring and a means of preventing unauthorised entry. 7. Contaminated wastewater must be managed by the Contractor to ensure existing water resources on the site are not contaminated. All wastewater from general activities in the camp shall be collected and removed from the site for appropriate disposal at a licensed commercial facility. <p>Water resources</p> <ol style="list-style-type: none"> 8. Site staff shall not be permitted to use any other open water body or natural water source adjacent to or within the designated site for the purposes of bathing, washing of clothing or for any construction or related activities. 9. Municipal water (or another source approved by the ECO) should instead be used for all activities such as washing of equipment or disposal of any type of waste, dust suppression, concrete mixing, compacting, etc. 10. Relevant departments and other emergency services should be contacted in order to deal with spillages and contamination of aquatic environments. 	
SPECIFIC MITIGATION MEASURES		
	<p>Designation of Highly Sensitive Areas</p> <ol style="list-style-type: none"> 11. The wetlands and drainage lines must be designated as “highly sensitive” and any impact must be limited to the minimum possible extent. All wetlands and drainage lines must be visibly demarcated prior to construction activities taking place where construction is within 50m of any delineated surface water resource. The demarcation of wetlands and drainage lines must be visible and last for the duration of the construction activities. 	

Establishment of Internal Road Crossing Areas

12. For general access to the various components of the wind farm, existing roads are to be used as far as possible. Where no other access exists to the desired construction areas and roads will be required into the surface water resources and the associated buffer zones, environmental authorisation and a water use license / general authorisation will be required before construction takes place. All mitigation measures are to be implemented accordingly.
13. A single access route into the internal road crossing areas through surface water resources are to be established before construction takes place, where required. The access route should follow existing routes where present. However, where new routes are to be established, temporary or permanent Ford (or low-water) crossings using the drainage line bed as part of the road and / or similar design crossings are to be established. Temporary ford crossings and / or similar design crossings can be planned where construction vehicles need to temporarily access proposed construction areas during construction the construction phase only. Where the access routes will form part of permanent access and / or service roads, permanent ford crossings and / or similar design crossings will however be required. Given the study area, and the temporary nature of surface water resources to be potentially affected, the ford designs should be adequate since it enables hydrological continuity of the identified temporary surface water resources, maintains substrate continuity as well as allows movement of riparian and wetland bound species. To establish a temporary ford crossing, little to no modification of the drainage line will be required where banks are low (approximately 1,2m) for drainage lines, where the grade or approach to the drainage line does not exceed 5:1 (horizontal to vertical) and lastly, where the stream bed is firm rock or gravel. Ideally, fords and / or similar design crossings should maintain the natural shape and elevation of the drainage line. However, where modification is required, the banks and bed will have to be reinstated after construction has finished. Modifications to the banks may include limited grading, excavation of steep slopes, establishment of clean gravel approach to drainage line and wetland banks, placement of road base, etc. Such modifications are likely to be required for crossings through surface water resources with soft substrate. To establish the temporary bed crossing, use of materials to construct temporary mats made of

	<p>wood or tyres can be used. Modifications will however need to be approved from the relevant environmental and water regulatory authorities prior to construction.</p> <p>14. For permanent ford crossings and / or similar design crossings, rock or gravel may be used on weak drainage line beds. The weak substrate layer will need to be excavated and infilled by the rock or gravel material to the same level of the original drainage line. A minimum of approximately 30cm of infill should typically be used unless soil depth is limited. A geotextile can be used to separate the infill from the bed of the surface water resource thereby providing additional support.</p> <p>15. Where other designs are more appropriate and these can be implemented, this is to be on approval from the relevant environmental and water regulatory authorities prior to construction.</p> <p>16. In general, the width of the internal road crossing areas must be limited to the width of the vehicles required to move through the relevant surface water resource(s). The internal road crossing areas must be made clearly visible by means of demarcation during construction. Ideally, for temporary ford crossings and / or similar design crossings, vegetation should not be totally cleared across the entire internal road crossing areas. Rather, only the vehicle tracks should be cleared. Remaining vegetation can be kept trimmed to below 20cm but not lower than 5cm in height. Trees or shrubs may however require removal. Permits must be obtained where sensitive or protected vegetation species are to be removed. Preferably, these should be relocated.</p> <p>17. Erosion inspections will need to be undertaken regularly (as often as environmental compliance monitoring is undertaken by a suitably qualified Environmental Compliance Officer (ECO) during the construction phase, and monthly during the operation phase) in order to manage the integrity of the temporary / permanent ford crossings and / or similar crossing designs. Additionally, rehabilitation will need to take place if and where required.</p> <p>18. Overall, no wetlands and / or drainage lines are to be crossed during or directly after a rainfall event. Use of internal road crossing areas are only permissible after rainfall events once flows have ceased.</p>	
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	<p>19. Preferably light vehicles are to be utilised where possible. Where heavy vehicles (such as TLB's) must be used, extreme caution is to be exercised when entering the internal road crossing areas drainage lines due soil instability factors.</p> <p>20. Construction personnel are only allowed in the designated internal road crossing areas. Any personnel traversing through the wetlands and / or drainage lines must be instructed not to light any fires, and / or remove any vegetation.</p> <p>Control of Alien and Invasive Vegetation in Surface Water Resources</p> <p>21. Control of alien and invasive vegetation within surface water resources will be required. Where alien and invasive vegetation encroachment / colonization takes place, these areas are to be cleared as soon as practically possible. Clearing should take place by means of mechanical removal, either by physically pulling or slashing and clearing of unwanted alien and invasive vegetation near or within the surface water resources. Monitoring of alien and invasive vegetation should be undertaken in accordance with the environmental compliance monitoring during the construction phase.</p> <p>Avoidance of Direct Impact to Delineated Surface Water Resources</p> <p>22. The lay-down area or any other permanent building structure (including wind turbines) must not be placed directly within any of the identified and delineated wetlands and / or drainage lines.</p> <p>Emergency Measures</p> <p>23. Operational fire extinguishers are to be available in the case of a fire emergency. Given the dry seasons and variable winds that the region experiences, it is recommended that a fire management and emergency plan is compiled. A suitably qualified health and safety officer must compile the fire management and emergency plan for the operation and maintenance phase of the project.</p> <p>Post-construction Rehabilitation</p> <p>24. Rehabilitation of the internal road crossing areas will be required post-construction. Ideally, the affected areas must be levelled, or appropriately sloped and scarified to loosen the soil and allow seeds contained in the natural seed bank to re-establish. However, given the aridity of the study area, it is likely that vegetation recovery will be slow. Rehabilitation areas</p>	
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will need to be monitored for erosion until vegetation can re-establish where prevalent. If affected areas are dry and no vegetation is present, the soil is to be re-instated and sloped.

Buffer Zone Specific Mitigation Measures

25. During construction activities, the outer extent of the buffer zones of the wetlands and drainage lines must be designated as “sensitive” and any impact must be limited to the minimum possible extent. The buffer zone extent must be visibly demarcated prior to construction activities taking place where construction is within 50m. The demarcation of the buffer zones must be visible and last for the duration of the construction activities.
26. The buffer zone areas are also to be included as part of the internal road crossing areas through the surface water resources.
27. All wind turbine hardstand areas within buffer zones are to be lined at the edges with grass blocks or similar run-off energy dissipating soft structures to prevent siltation within drainage lines downstream during construction. For the operation phase, permanent run-off dissipating structures are to be implemented as part of the stormwater designs and management plan.
28. See above for same access internal road crossing area mitigation measures to be implemented within buffer zones.

Preventing Increased Run-off, Erosion and Sedimentation Impacts

29. Vegetation clearing should take place in a phased manner, only clearing areas that will be constructed on immediately. Vegetation clearing must not take place in areas where construction will only take place in the distant future.
30. An appropriate storm water management plan formulated by a suitably qualified professional must accompany the proposed development to deal with increased run-off in the designated construction areas.
31. In general, adequate structures must be put into place (temporary or permanent where necessary in extreme cases) to deal with increased/accelerated run-off and sediment volumes. The use of silt fencing and potentially sandbags or hessian “sausage” nets can be used to prevent erosion in susceptible construction areas during the construction phase. Grass blocks on the perimeter of the wind turbine hard stand areas or similar soft engineering structures can also be used to reduce run-off and onset of erosion.

	<p>32. Where required more permanent structures such as attenuation ponds and gabions can be constructed if needs be, however this is unlikely given the study area. All impacted areas are to be adequately sloped to prevent the onset of erosion.</p> <p>33. Erosion control management will need to be undertaken at the onset of construction. Regular monitoring and adequate erosion preventative measures (such as run-off protection as stipulated above) are to be implemented as and where required.</p> <p>Preventing Soil and Water Contamination</p> <p>34. No vehicles are to be allowed in the highly sensitive and sensitive areas unless authorised. Should vehicles be authorized in highly sensitive areas, all vehicles and machinery are to be checked for oil, fuel or any other fluid leaks before entering the required construction areas. Should there be any oil, fuel or any other fluid leaks, vehicles and machinery are not to be allowed into any drainage sensitive and highly sensitive areas.</p> <p>35. All vehicles and machinery must be regularly serviced and maintained before being allowed to enter the construction areas. No fuelling, re-fuelling, vehicle and machinery servicing or maintenance is to take place in the highly sensitive and sensitive areas.</p> <p>36. Sufficient spill contingency measures must be available throughout the construction process. These include, but are not limited to, oil spill kits to be available and fire extinguishers.</p> <p>37. Storage areas for fuel, oil, paints and other hazardous substance are not to be stored directly within surface water resources or the associated buffer zones.</p> <p>38. No “long drop” toilets are allowed on the construction site. Suitable temporary chemical sanitation facilities are to be provided. Temporary chemical sanitation facilities must not be placed directly within any surface water resource(s) or the associated buffer zones. Temporary chemical sanitation facilities must be checked regularly for maintenance purposes and cleaned often to prevent spills.</p> <p>39. No cement mixing is to take place in any surface water resource. In general, any cement mixing should take place over a bin lined (impermeable) surface or alternatively in the load bin of a vehicle to prevent the mixing of cement with the ground. Importantly, no mixing of cement directly on the surface is allowed in the highly sensitive and sensitive areas.</p> <p>Preventing Impacts to Fauna Associated with Drainage lines and Wetlands</p>	
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	<p>40. No animals on the construction site or surrounding areas are to be hunted, captured, trapped, removed, injured, killed or eaten by construction workers or any other project team members. Should any party be found guilty of such an offence, stringent penalties should be imposed. The appointed Environmental Control Officer (ECO) or suitably qualified individual may only remove animals, where such animals (including snakes, scorpions, spiders etc.) are a threat to construction workers. The ECO or appointed individual is to be contacted should removal of any fauna be required during the construction phase. Animals that cause a threat and need to be removed, may not be killed. Additionally, these animals are to be relocated outside the internal road crossing areas or construction areas, within relative close proximity where they were found.</p>	
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3.4.9 Waste Management

Table 19: Waste Management

IMPACT	WASTE MANAGEMENT This section deals with waste management and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	CONSTRUCTION	MC, EO, ECO
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	<p>Litter management</p> <ol style="list-style-type: none"> 1. Refuse bins must be placed at strategic positions to ensure that litter does not accumulate within the construction site. 2. An approved waste disposal contractor must be employed to remove and recycle waste oil, if practical. The contractor must ensure that its staff is made aware of the health risks associated with any hazardous substances used and has been provided with the appropriate protective clothing/equipment in case of spillages or accidents and have received the necessary training. 3. 	

	<ol style="list-style-type: none"> 4. The Contractor shall supply waste collection bins where such is not available and all solid waste collected shall be disposed of at registered/licensed landfill. 5. A housekeeping team should be appointed to regularly maintain the litter and rubble situation on the construction site. 6. If possible and feasible, all waste generated on site must be separated into glass, plastic, paper, metal and wood and recycled. An independent contractor can be appointed to conduct this recycling. 7. Littering by the employees of the Contractor shall not be allowed under any circumstances. The ECO shall monitor the neatness of the work sites as well as the Contractor campsite. 8. Skip waste containers should be maintained on site. These should be kept covered and arrangements made for them to be collected regularly. 9. All waste must be removed from the site and transported to a landfill site promptly to ensure that it does not attract vermin or produce odours. 10. Where a registered waste site is not available close to the construction site, the Contractor shall provide a method statement with regard to waste management. 11. A certificate of disposal shall be obtained by the Contractor and kept on file, if relevant. 12. Under no circumstances may solid waste be burnt on site. 13. All waste must be removed promptly to ensure that it does not attract vermin or produce odours. <p>Hazardous waste</p> <ol style="list-style-type: none"> 14. All waste hazardous materials, if present, must be carefully stored as advised by the ECO, and then disposed of off-site at a licensed landfill site, where practical. 15. Contaminants to be stored safely to avoid spillage. 16. Machinery must be properly maintained to keep oil leaks in check 17. All necessary precaution measures shall be taken to prevent soil or surface water pollution from hazardous materials used during construction and any spills shall immediately be cleaned up and all affected areas rehabilitated <p>Sanitation</p> <ol style="list-style-type: none"> 18. The Contractor shall install mobile chemical toilets on the site. 	
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	<p>19. Staff shall be sensitised to the fact that they should use these facilities at all times. No indiscriminate sanitary activities on site shall be allowed.</p> <p>20. Ablution facilities shall be within proximity from workplaces and not closer than 100m from any natural water bodies or boreholes. There should be enough toilets available to accommodate the workforce (minimum requirement 1: 15 workers). Male and females must be accommodated separately where possible.</p> <p>21. Toilets shall be serviced regularly and the ECO shall inspect toilets regularly.</p> <p>22. Toilets should be no closer than 100m or above the 1:100 year flood line from any natural or manmade water bodies or drainage lines or alternatively located in a place approved of by the Engineer.</p> <p>23. Under no circumstances may open areas, neighbours fences or the surrounding bush be used as a toilet facility.</p> <p>24. The construction of “Long Drop” toilets are forbidden. Rather, portable toilets are to be used.</p> <p>25. Potable water must be provided for all construction staff.</p> <p>Remedial actions</p> <p>26. Depending on the nature and extent of the spill, contaminated soil must be either excavated or treated on-site.</p> <p>27. Excavation of contaminated soil must involve careful removal of soil using appropriate tools/machinery to storage containers until treated or disposed of at a licensed hazardous landfill site.</p> <p>28. The ECO must determine the precise method of treatment for polluted soil. This could involve the application of soil absorbent materials as well as oil-digestive powders to the contaminated soil.</p> <p>29. If a spill occurs on an impermeable surface such as cement or concrete, the surface spill must be contained using oil absorbent material.</p> <p>30. If necessary, oil absorbent sheets or pads must be attached to leaky machinery or infrastructure.</p> <p>31. Materials used for the remediation of petrochemical spills must be used according to product specifications and guidance for use.</p>	
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	<p>32. Contaminated remediation materials must be carefully removed from the area of the spill so as to prevent further release of petrochemicals to the environment, and stored in adequate containers until appropriate disposal.</p> <p>33. Implement effective spillage and waste management system.</p>	
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3.4.10 Flora

Table 20: Flora

IMPACT	FLORA This section deals with flora and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	CONSTRUCTION	MC, EO, ECO
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	<p>Existing vegetation</p> <ol style="list-style-type: none"> 1. Vegetation removal must be limited to the construction site. 2. Vegetation to be removed as it becomes necessary rather than removal of all vegetation throughout the site in one step. 3. Materials should not be delivered to the site prematurely which could result in additional areas being cleared or affected. 4. No vegetation to be used for firewood. <p>Rehabilitation</p> <ol style="list-style-type: none"> 5. All damaged areas shall be rehabilitated upon completion of the contract 6. Re-vegetation of the disturbed site is aimed at approximating as near as possible the natural vegetative conditions prevailing prior to construction. 7. All natural areas impacted during construction must be rehabilitated with locally indigenous species typical of the representative botanical unit. 8. Rehabilitation must take place in a phased approach as soon as possible. 9. Rehabilitation process must make use of species indigenous to the area. Seeds from surrounding seed banks can be used for re-seeding. 	

	<p>10. Rehabilitation must be executed in such a manner that surface run-off will not cause erosion of disturbed areas.</p> <p>Demarcation of construction and laydown areas</p> <p>11. All plants not interfering with the construction of the wind energy facility shall be left undisturbed. Species of special concern shall be clearly marked.</p> <p>12. The construction area must be well demarcated and no construction activities must be allowed outside of this demarcated footprint.</p> <p>13. Vegetation removal must be phased in order to reduce impact of construction.</p> <p>14. Construction site office and laydown areas must be clearly demarcated and no encroachment must occur beyond demarcated areas.</p> <p>15. Strict and regular auditing of the wind energy facility construction process to ensure containment of the construction and laydown areas.</p> <p>16. Soils must be kept free of petrochemical solutions that may be kept on site during construction. Spillage can result in a loss of soil functionality thus limiting the re-establishment of flora.</p> <p>Utilisation of resources</p> <p>17. Gathering of firewood, fruit, multi plants, or any other natural material onsite or in areas adjacent to the site is prohibited unless with prior approval of the ECO.</p> <p>Exotic vegetation</p> <p>18. Alien vegetation on the site will need to be controlled.</p> <p>19. The contractor should be responsible for implementing a programme of weed control (particularly in areas where soil has been disturbed); and grassing of any remaining stockpiles to prevent weed invasion.</p> <p>20. The spread of exotic species occurring throughout the site should be controlled.</p> <p>Herbicides</p> <p>21. Herbicide use shall only be allowed according to contract specifications. The application shall be according to set specifications and under supervision of a qualified technician. The possibility of leaching into the surrounding environment shall be properly investigated and only environmentally friendly herbicides shall be used.</p>	
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	22. The use of pesticides and herbicides on the site must be discouraged as these can impact on important pollinator species of indigenous vegetation.	
SPECIFIC MITIGATION MEASURES		
	<p>23. Placement of turbines within the High Sensitivity areas and drainage lines should be avoided.</p> <p>24. Ensure that lay-down and other temporary infrastructure is within low sensitivity areas, preferably previously transformed areas if possible.</p> <p>25. Minimise the development footprint as far as possible and rehabilitate disturbed areas that are no longer required by the operational phase of the development.</p> <p>26. A large proportion of the impact of the development stems from the access roads and the number of roads should be reduced to the minimum possible and routes should also be adjusted to avoid areas of high sensitivity as far as possible, as informed by a preconstruction walk-through survey.</p> <p>27. Demarcate all areas to be cleared with construction tape or other appropriate and effective means. However caution should be exercised to avoid using material that might entangle fauna.</p> <p>28. All disturbed areas that are not used such as excess road widths, should be rehabilitated with locally occurring shrubs and grasses after construction to reduce the overall footprint of the development.</p>	

3.4.11 Fauna

Table 21: Fauna

IMPACT	FAUNA This section deals with fauna and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	CONSTRUCTION	MC, EO, ECO
ENVIRONMENTAL MANAGEMENT PROGRAMME		

MITIGATION / METHOD STATEMENT	<ol style="list-style-type: none"> 1. Demarcation of sensitive areas must be verified on site by the ECO prior to construction activities starting. 2. Use of appropriate construction techniques. 3. Rehabilitation to be undertaken as soon as possible after construction has been completed. 4. No trapping or snaring to fauna on the construction site is allowed unless dangerous/venomous snakes are found. In this case all staff must be provided with the appropriate snake handling and removal training and the necessary permits must be obtained from the relevant conservation authority before any snakes are trapped and removed from the site. 5. No faunal species are to be harmed by maintenance staff during any routine maintenance at the development. 6. No animals are to be kept as pets. 7. All personnel should undergo environmental induction with regards to fauna and in particular awareness about not harming or collecting species such as snakes, tortoises and owls which are often persecuted out of superstition. 	
SPECIFIC MITIGATION MEASURES		
	<ol style="list-style-type: none"> 8. During construction any fauna directly threatened by the construction activities should be removed to a safe location by the ECO or other suitably qualified person. 9. The illegal collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden. Personnel should not be allowed to wander off the construction site. 10. No fires should be allowed within the site as there is a risk of runaway veld fires. 11. No fuelwood collection should be allowed on-site. 12. No dogs or cats should be allowed on site apart from that of the landowners. 13. If any parts of site such as construction camps must be lit at night, this should be done with low-UV type lights (such as most LEDs) as far as practically possible, which do not attract insects and which should be directed downwards. 14. All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill. 	

	<p>15. No unauthorized persons should be allowed onto the site and site access should be strictly controlled</p> <p>16. All construction vehicles should adhere to a low speed limit (40km/h for cars and 30km/h for trucks) to avoid collisions with susceptible species such as snakes and tortoises and rabbits or hares. Speed limits should apply within the facility as well as on the public gravel access roads to the site.</p> <p>17. All personnel should undergo environmental induction with regards to fauna and in particular awareness about not harming or collecting species such as snakes, tortoises and snakes which are often persecuted out of fear or superstition.</p> <p>18. All construction vehicles should adhere to a low speed limit (40km/h for cars and 30km/h for trucks) to avoid collisions with susceptible species such as snakes and tortoises and rabbits or hares. Speed limits should apply within the facility as well as on the public gravel access roads to the site.</p> <p>19. It is essential that project specific mitigations be applied and adhered to for each project, as there is no overarching mitigation that can be recommended on a regional level due to habitat and ecological differences between project sites. Adhere to the sensitivity map during any further turbine layout revisions..</p>	
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3.4.12 Bats

Table 22: Bats

IMPACT	BATS This section deals with bats and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	CONSTRUCTION	MC, EO, ECO
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	<p>Earthworks and Blasting</p> <p>1. Adhere to the sensitivity map during turbine placement. Blasting should be minimised and used only when necessary. A Bat Specialist should be consulted before blasting of a rocky cliff face or rocky cavernous area.</p>	

	<ol style="list-style-type: none"> 2. Adhere to recommended mitigation measures for this project as described in Section 8 of the bat report. 3. Adhere to the sensitivity map during any further turbine layout revisions. <p>Foraging Habitat</p> <ol style="list-style-type: none"> 4. Adhere to the sensitivity map. Keep to designated areas when storing building materials, resources, turbine components and/or construction vehicles and keep to designated roads with all construction vehicles. Damaged areas not required after construction should be rehabilitated by an experienced vegetation succession specialist. 	
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3.4.13 Avifauna

Table 23: Avifauna Impact

IMPACT	Avifauna This section deals with avifaunal issues and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	CONSTRUCTION	MC, EO, ECO
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	<ol style="list-style-type: none"> 1. Ensure that key areas of conservation importance and sensitivity are avoided. 2. Implement appropriate working practices to protect sensitive habitats. 3. Provide adequate briefing for site personnel and, in particularly sensitive locations, employing an on-site ecologist during construction. 4. Implement an agreed post-development monitoring programme. 5. Where possible, install low voltage collector cables between the turbines underground (subject to habitat sensitivities and in accordance with existing best practice guidelines for underground cable installation). 	

	<p>6. Mark overhead cables using deflectors where required and avoiding use over areas of high bird concentrations, especially for species vulnerable to collision.</p> <p>7. Time construction to avoid sensitive periods, where possible.</p> <p>8. Implement habitat enhancement for species using the site.</p>	
SPECIFIC MITIGATION MEASURES		
	<p>9. Restrict the construction activities to the construction footprint area.</p> <p>10. Do not allow any access to the remainder of the property during the construction period.</p> <p>11. Measures to control noise and dust should be applied according to current best practice in the industry.</p> <p>12. Maximum used should be made of existing access roads and the construction of new roads should be kept to a minimum.</p> <p>13. A 300m exclusion zone should be implemented around the existing water points where no construction activity or disturbance should take place.</p> <p>14. A 300m exclusion zone should be implemented around the Greater Kestrel nest where no construction activity or disturbance should take place.</p> <p>15. The recommendations of the specialist ecological study must be strictly adhered to.</p> <p>16. Post-construction monitoring should be implemented to make comparisons with baseline conditions possible.</p> <p>17. If densities of key priority species are proven to be significantly reduced due to the operation of the wind farm, the management of the wind farm must be engaged to devise ways of reducing the impact on these species.</p>	

3.4.14 Air Quality

Table 24: Air Pollution

IMPACT	AIR POLLUTION	RESPONSIBILITY
	<p>This section deals with air pollution and actions that need to be implemented during construction</p>	

PHASE	CONSTRUCTION	MC, EO, ECO
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION	<p>Dust control</p> <ol style="list-style-type: none"> 1. Wheel washing and damping down of un-surfaced and un-vegetated areas must be undertaken if required. 2. Retention of vegetation where possible will reduce dust travel. 3. Clearing activities must only be done during agreed working times and permitting weather conditions to avoid drifting of sand and dust into neighbouring areas. 4. Damping down of all exposed soil surfaces with a water bowser or sprinklers when necessary to reduce dust. 5. The Contractor shall be responsible for dust control on site to ensure no nuisance is caused to the neighbouring communities. 6. A speed limit of 30km/h must not be exceeded on site. 7. Any complaints or claims emanating from the lack of dust control shall be attended to immediately by the Contractor. 8. Any dirt roads that are utilised by the workers must be regularly maintained to ensure that dust levels are controlled. <p>Odour control</p> <ol style="list-style-type: none"> 9. Regular servicing of vehicles in order to limit gaseous emissions. 10. Regular servicing of on-site toilets to avoid potential odours. 11. Allocated cooking areas must be provided. 12. The contractor must make alternative arrangements (other than fires) for cooking and/ or heating requirements. LP gas cookers may be used provided that all safety regulations are followed. <p>Rehabilitation</p> <ol style="list-style-type: none"> 13. The contractor should commence rehabilitation of exposed soil surfaces as soon as practical after completion of earthworks. <p>Fire prevention</p> <ol style="list-style-type: none"> 14. No open fires shall be allowed on site under any circumstance. All cooking shall be done in demarcated areas that are safe and cannot cause runaway fires. 	

	15. The Contractor shall have operational fire-fighting equipment available on site at all times. The level of firefighting equipment must be assessed and evaluated through a typical risk assessment process.	
SPECIFIC MITIGATION MEASURES		
	16. Dust suppression techniques should be utilised to reduce the impact on air quality for the surrounding area.	

3.4.15 Noise and Vibrations

Table 25: Noise and Vibrations

IMPACT	NOISE	RESPONSIBILITY
	This section deals with noise and actions that need to be implemented during construction	
PHASE	CONSTRUCTION	MC, EO, ECO
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION METHOD STATEMENT	<ol style="list-style-type: none"> 1. The construction phase must aim to adhere to the relevant noise regulations and limit noise to within standard working hours in order to reduce disturbance of surrounding farms. 2. Construction site yards, workshops, concrete batching plants, and other noisy fixed facilities should be located well away from noise sensitive areas. Once the proposed final layouts are made available by the contractor(s), the sites must be evaluated in detail and specific measures designed in to the system. 3. Truck traffic should be routed away from noise sensitive areas, where possible. 4. Noise levels must be kept within acceptable limits. 5. Noisy operations should be combined so that they occur where possible at the same time. 6. Construction activities are to be contained to reasonable hours during the day and early evening. Night-time activities near noise sensitive areas should not be allowed. 7. Construction workers to wear necessary ear protection gear. 8. Noisy activities to take place during allocated construction hours. 	

	<p>9. Noise from labourers must be controlled.</p> <p>10. Noise suppression measures must be applied to all construction equipment. Construction equipment must be kept in good working order and where appropriate fitted with silencers which are kept in good working order. Should the vehicles or equipment not be in good working order, the contractor may be instructed to remove the offending vehicle or machinery from site.</p> <p>11. The contractor must take measures to discourage labourers from loitering in the area and causing noise disturbance. Where possible labour shall be transported to and from the site by the contractor or his Sub-Contractors by the contractors own transport.</p> <p>12. Implementation of enclosure and cladding of processing plants.</p> <p>13. Applying regular and thorough maintenance schedules to equipment and processes. An increase in noise emission levels very often is a sign of the imminent mechanical failure of a machine.</p> <p>14. Route construction traffic as far as practically possible from potentially sensitive receptors.</p> <p>15. Ensure a good working relationship between the developer and all potentially sensitive receptors. Communication channels should be established to ensure prior notice to the sensitive receptor if work is to take place close to them. Information that should be provided to the potential sensitive receptor(s) include:</p> <ul style="list-style-type: none"> ▪ Proposed working times; ▪ how long the activity is anticipated to take place; ▪ what is being done, or why the activity is taking place; ▪ contact details of a responsible person where any complaints can be lodged should there be an issue of concern. <p>16. When working near (within 500 meters – potential construction of access roads and trenches) to a potential sensitive receptor(s), limit the number of simultaneous activities to the minimum as far as possible;</p> <p>17. When working in very close proximity to potentially sensitive receptors, coordinate the working time with periods when the receptors are not at home where possible. An example would be to work within the 08:00 to 17:00 time-slot to minimize the significance of the impact because:</p> <ul style="list-style-type: none"> ▪ Potential receptors are most likely at school or at work, minimizing the probability of an impact happening; 	
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	<ul style="list-style-type: none"> ▪ Normal daily activities will generate other noises that would most likely mask construction noises, minimizing the probability of an impact happening. <p>18. Reduce the noise impact during the construction phase by:</p> <ul style="list-style-type: none"> ▪ Using the smallest/quietest equipment for the particular purpose. For modelling purposes the noise emission characteristics of large earth-moving equipment (typically of mining operations) were used, that would most likely over-estimate the noise levels. The use of smaller equipment therefore would have a significantly lower noise impact; ▪ Ensuring that equipment is well-maintained and fitted with the correct and appropriate noise abatement measures. 	
SPECIFIC MITIGATION MEASURES		
	<p>19. Ensure equivalent A-weighted noise levels below 45 dBA at potentially sensitive receptors.</p> <p>20. Ensure that maximum noise levels at potentially sensitive receptors be less than 65 dBA;</p> <p>21. Prevent the generation of disturbing or nuisance noises;</p> <p>22. Ensure acceptable noise levels at surrounding stakeholders and potentially sensitive receptors;</p> <p>23. Ensuring compliance with the National Noise Control Regulations.</p> <p>24. Relocate access roads further from houses. To minimize noise levels below a low significance ensure that grid lines are further than 220m from dwellings used for residential purposes during the construction period.</p> <p>25. Construct the access roads during a period when receptors are not using their dwellings.</p> <p>26. Due to the low ambient sound levels, it is highly recommended that no construction activities are allowed within 580m from occupied dwellings at night. This includes construction of roads, power lines or construction of wind turbines.</p> <p>27. Locate contractor's camp and storage areas at locations where construction traffic will not need to pass occupied dwellings (or pass them minimally). Develop a separate or upgrade an existing access road to the contractors camp to minimise traffic past residents.</p> <p>28. The developer can change the layout and not develop any wind turbines within approximately 1,200m from NSD03 (due to the cumulative effects of the number of wind turbines proposed in the area), or the number of wind turbines closer than 1,500m from potential noise-sensitive receptors can be reduced.</p>	

	<p>29. The developer can use a different wind turbine that have a maximum sound power emission level of less than 106dBA.</p> <p>30. The developer can confirm periods when the dwelling will be used for residential purposes, and the closest wind turbines can be operated in a noise mode that generates less noise (less than 106dBA) or one or more of these wind turbines can be switched off.</p> <p>31. Ensure that noise as a component is included in the induction of employees and contractors, and how their activities and actions can impact on residents in the area (reverse alarms and reversing close to dwellings, driving fast past residential dwellings at night, maintenance of equipment). All contractors and employees should receive this induction.</p> <p>32. At all stages surrounding receptors should be informed about the sound generated by wind turbines. The information presented to stakeholders should be factual and should not set unrealistic expectations. It is counterproductive to suggest that the wind turbines will be inaudible, or to use vague terms like “quiet”. Modern wind turbines produce a sound due to the aerodynamic interaction of the wind with the turbine blades, audible as a “swoosh”, which can be heard at some distance from the turbines. The magnitude of the sound will depend on a multitude of variables and will vary from day to day and from place to place with environmental and operational conditions. Similarly, potential annoyance levels have been linked to visibility and audibility. Audibility is distinct from the sound level, because it depends on the relationship between the sound level from the wind turbines and the ambient background sound level and character.</p> <p>33. Community involvement needs to continue throughout the project. Annoyance is a complicated psychological phenomenon; as with many industrial operations, expressed annoyance with sound can reflect an overall annoyance with the project, rather than a rational reaction to the sound itself. Wind projects offer a benefit to the environment and the energy supply for the greater population, and offer economic benefits to the land owners leasing installation sites to the wind farm. A positive community attitude throughout the greater area should be fostered, particularly with those residents near the wind farm, to ensure they do not feel that advantage have been taken of them.</p> <p>34. The developer must implement a line of communication (i.e. a help line where complaints could be lodged. All potential sensitive receptors should be made aware of these contact numbers. The Wind Energy Facility should maintain a commitment to the local community and respond to concerns in an expedient fashion. Sporadic and legitimate noise complaints could develop. For</p>	
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	<p>example, sudden and sharp increases in sound levels could result from mechanical malfunctions or perforations or slits in the blades. Problems of this nature can be corrected quickly, and it is in the developer's interest to do so.</p> <p>35. Confirm with the residents in the area when they will be using their dwellings. Plan construction activities close to their dwellings when they are not at their houses. Construct the access roads close to their dwellings during a period when receptors are not using their dwellings.</p> <p>36. The potential noise impact must again be evaluated should the layout be changed where any wind turbines are located closer than 1,000m from a confirmed NSD.</p> <p>37. The developer must investigate any reasonable and valid noise complaint if registered by a receptor staying within 2,000m from location where construction activities are taking place or operational wind turbine.</p> <p>38. No access roads should be developed closer than 250m from dwellings that will be occupied during the construction period.</p> <p>39. The developer must change the layout to ensure that total noise levels are less than 45 dBA. This layout must be assessed by an independent acoustician. The developer must change the layout to ensure that total cumulative noise levels are less than 45 dBA. This cumulative layout must be assessed by an independent acoustician.</p> <p>40. Relocate access roads further than 250m from dwellings that will be occupied during the construction period. If these roads will be used during the night, these roads should be further from occupied dwellings.</p> <p>41. Establish a line of communication and notify all stakeholders and NSDs of the means of registering any issues, complaints or comments.</p> <p>42. Identify and compile a list of potential noise-sensitive receptors and when they will be using their houses for residential purposes. Plan construction activities close to their dwellings when they are not staying in the dwellings (within 500m).</p>	
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	<p>43. Notify potentially sensitive receptors about work to take place at least 2 days before the activity in the vicinity (within 500 meters) of the NSD is to start. Following information to be presented in writing:</p> <ul style="list-style-type: none"> ▪ Description of Activity to take place; ▪ Estimated duration of activity; ▪ Working hours; ▪ Contact details of responsible party. <p>44. Ensure that all equipment is maintained and fitted with the required noise abatement equipment.</p> <p>45. When any noise complaints are received, noise monitoring should be conducted at the complainant, followed by feedback regarding noise levels measured.</p> <p>46. The construction crew must abide by the local by-laws regarding noise.</p> <p>47. Where possible construction work should be undertaken during normal working hours (06H00 – 22H00), from Monday to Saturday; If agreements can be reached (in writing) with the all the surrounding (within a 1,000 distance) potentially sensitive receptors, these working hours can be extended.</p>	
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3.4.16 Energy use

Table 26: Energy Use

IMPACT	ENERGY USE This section deals with energy use and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	CONSTRUCTION	MC, EO, ECO
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	<ol style="list-style-type: none"> 1. Energy saving lighting must be implemented across the board. 2. Water saving measures must be implemented across the facility to ensure little wastage. 3. Minimal lighting, while maintaining health and safety regulations, must be kept on during the night operations. 4. Equipment not in use must be switched off and unplugged to save on unnecessary energy costs. 	

3.4.17 Employment

Table 27: Employment

IMPACT	EMPLOYMENT This section deals with employment and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	CONSTRUCTION	PM, MC, EO, CLO
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	<p>Labour</p> <ol style="list-style-type: none"> 1. The use of labour intensive construction measures should be used where appropriate. 2. Training of labour to benefit individuals. <p>Recruitment Plan</p>	

	<ol style="list-style-type: none"> 3. The majority of unskilled labourers should be drawn from the local market and where possible use should be made of local semiskilled and skilled personnel. 4. Local suppliers to be used where possible. 5. The Project Manager must ensure that all staff working on the proposed project are in possession of a South African Identity Document or a relevant work permit. 6. Ensure adequate advertising in the project community areas, local papers for labour. Adverts are to be placed in each area where the public meetings were conducted. 7. Local community key stakeholders must be utilised to source labour where possible. 8. The recruitment process must be equitable and transparent. A concerted effort will be made to guard against nepotism and/or any form of favouritism during the process. 9. The recruitment of skilled labour will follow standard advertising process in national newspapers and interview based selection. 10. A record of official complaints by employees is to be maintained and a grievance mechanism should be put in place for all employees. 	
SPECIFIC MITIGATION MEASURES		
	<ol style="list-style-type: none"> 11. Drafting legal and binding enforcements stipulating that majority of the unskilled positions in the project be allocated to local labourers. 12. Where possible, subcontract to local construction companies. 13. Consultation with local authorities is essential so as to manage job creation expectations and ensure that all eligible workers in the primary study area are informed of the opportunities. 14. Developers should be open to local recruitment processes and be willing to offer some skills transfer during this phase of the project to ensure maximum local labour procurement. 15. Recruitment should be done following a transparent approach and adequately communicated in the area to limit the chances of people staying for longer period in hope of finding a job. 16. Initiating the education campaign among the local community (in partnership with the community members already active in the area) focusing specifically on vulnerable groups of population and motivating them to make right choices in their lives. 17. The project proponent should provide learnerships to locals apart from the on-the-job training for employed individuals. This will address the issues of the reduced employment and skills 	

	<p>development opportunities by increasing the chances of local labour to receive employment when a similar development is established in the region.</p> <p>18. Recruit local labour as far as possible so as to ensure that the benefits accrue to local households within the community.</p> <p>19. Employ labour-intensive methods as far as feasible in the construction phase.</p> <p>20. Where possible, sub-contract to local companies.</p> <p>21. Where possible and feasible, local procurement of labour, goods, and services must be practiced to maximise the benefit to the local economy.</p> <p>22. Where possible, ensure that the local community members are prioritised for the allocation of the created jobs.</p> <p>23. Contracts ensuring that on-the-job training is included and enforced as a condition for the development of this project.</p> <p>24. To improve the chances of skills development during the construction phase, contractors are encouraged to provide learner-ships and encourage further knowledge sharing.</p> <p>25. It is advisable that investment into skills development of the local community occurs prior the start of project's operations. As such it is recommended that training provided by the project proponent should not only be limited to the people receiving formal employment, but also those who desire to receive such skills. This will ensure that the local labour has a competitive advantage over job-seekers from outside areas.</p> <p>26. Contracts ensuring that knowledge sharing and on-the-job training should be enforced as a condition for the development of the project.</p> <p>27. To ensure that skills are adequately acquired, additional training programmes need to be held during the construction phase to prepare the identified community members to be employed at the next phase, i.e. operational.</p>	
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*Please note: The recruitment plan may slightly change from time to time as the main construction contractors have not been selected.

3.4.18 Occupational Health and Safety

Table 28: Occupational Health and Safety

IMPACT	HEALTH AND SAFETY This section deals with health and safety and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	CONSTRUCTION	MC / EO / ECO / CLO
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	<p>Worker safety</p> <ol style="list-style-type: none"> 1. Implementation of safety measures, work procedures and first aid must be implemented on site. 2. Workers should be thoroughly trained in using potentially dangerous equipment. 3. Contractors must ensure that all equipment is maintained in a safe operating condition. 4. A safety officer must be appointed. 5. A record of health and safety incidents must be kept on site. 6. Any health and safety incidents must be reported to the Project Manager immediately. 7. First aid facilities must be available on site at all times and a number of employees trained to carry out first aid procedures. 8. Workers have the right to refuse work in unsafe conditions. 9. The Contractor shall take all the necessary precautions against the spreading of disease such as measles, foot and mouth, etc. especially under livestock. 10. A record shall be kept of drugs administered or precautions taken and the time and dates when this was done. This can then be used as evidence in court should any claims be instituted against the Project Company or the Contractor. 11. The contractor must ensure that all construction workers are well educated about HIV/ AIDS and the risks surrounding this disease. The location of the local clinic where more information and counselling is offered must be indicated to workers. 12. Material stockpiles or stacks must be stable and well secured to avoid collapse and possible injury to site workers / local residents. <p>Worker facilities</p>	

	<p>13. Eating areas should be regularly serviced and cleaned to ensure the highest possible standards of hygiene and cleanliness.</p> <p>14. Fires are not to be allowed outside controlled areas.</p> <p>Hazardous substances</p> <p>15. Working areas should be provided with adequate ventilation and dust/fume extraction systems to ensure that inhalation exposure levels for potentially corrosive, oxidizing, reactive or siliceous substances are maintained and managed at safe levels.</p> <p>Machinery and Equipment</p> <p>16. Use of contrast colouring on equipment/ machinery including the provision of reflective markings to enhance visibility.</p> <p>17. Use of moving equipment/machinery equipped with improved operator sight lines.</p> <p>18. Issuing workers with high visibility clothing.</p> <p>19. Use of reflective markings on structures, traffic junctions, and other areas with a potential for accidents.</p> <p>20. Installing safety barriers in high risk locations.</p> <p>Fitness for work</p> <p>21. Review shift management systems to minimize risk of fatigue. Establish alcohol and other drugs policy for the operation.</p> <p>Travel and remote site health</p> <p>22. Develop programs to prevent both chronic and acute illnesses through appropriate sanitation and vector control systems.</p> <p>23. Where food is prepared on site, food preparation storage and disposal should be reviewed regularly and monitored to minimise risk of illness.</p> <p>Protective gear</p> <p>24. Personal Protective Equipment (PPE) must be made available to all construction staff and must be compulsory. Hard hats and safety shoes must be worn at all times and other PPE worn were necessary i.e. dust masks, ear plugs etc.</p> <p>25. No person is to enter the site without the necessary PPE.</p> <p>Site safety</p> <p>26. The construction camp must remain fenced for the entire construction period.</p>	
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	<p>27. Potentially hazardous areas are to be demarcated and clearly marked.</p> <p>28. Adequate warning signs of hazardous working areas.</p> <p>29. Emergency numbers for local police and fire department etc. must be placed in a prominent area.</p> <p>30. Firefighting equipment must be placed in prominent positions across the site where it is easily accessible. This includes fire extinguishers, a fire blanket as well as a water tank.</p> <p>31. Suitable conspicuous warning signs in English and all other applicable languages must be placed at all entrances to the site.</p> <p>32. All speed limits must be adhered to.</p> <p>Construction equipment safety</p> <p>33. All equipment used for construction, including drills, TLB's must be in good working order with up to date maintenance records.</p> <p>Hazardous Material Storage</p> <p>34. All storage tanks containing hazardous materials (fuel) must be placed in bunded containment areas with sealed surfaces. The bund walls must be high enough to contain 110% of the total volume of the stored hazardous material. These areas should be roofed to avoid contamination of stormwater.</p> <p>35. Material Safety Data Sheets (MSDS) which contain the necessary information pertaining to a specific hazardous substance must be present for all hazardous materials stored on the site.</p> <p>Procedure in the event of a petrochemical spill</p> <p>36. A spill kit needs to be kept on site to address any unforeseen spillages.</p> <p>37. The individual responsible for or who discovers the petrochemical spill must report the incident to the Project Manager, Contractor or ECO.</p> <p>38. The problem must be assessed and the necessary actions required will be undertaken.</p> <p>39. The immediate response must be to contain the spill.</p> <p>40. The source of the spill must be identified, controlled, treated or removed wherever possible.</p> <p>Fire management</p> <p>41. Firefighting equipment should be present on site at all times.</p> <p>42. All construction staff must be trained in fire hazard control and firefighting techniques.</p>	
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	<p>43. All flammable substances must be stored in dry areas which do not pose an ignition risk to the said substances.</p> <p>44. No open fires will be allowed on site.</p> <p>45. Smoking may only be conducted in demarcated areas.</p> <p>Safety of surrounding residents</p> <p>46. All I & AP's should be notified in advance of any known potential risks associated with the construction site and the activities on it. Examples of these are:</p> <ul style="list-style-type: none"> ○ Blasting ○ Earthworks / earthmoving machinery on steep slopes above houses / infrastructure ○ Risk to residence along haulage roads / access routes <p>Emergency evacuation plan</p> <p>47. Upon completion of the construction phase, an emergency preparedness plan must be drawn up to ensure the safety of the staff and surrounding land users in the case of an emergency.</p> <p>48. All staff must undergo safety training.</p> <p>Maintenance</p> <p>49. The wind energy facility and surrounding areas are to be regularly maintained. A maintenance schedule must be drawn up and records of all maintenance kept.</p>	
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3.4.19 Security

Table 29: Security

IMPACT	SECURITY	RESPONSIBILITY
	This section deals with security and actions that need to be implemented during construction	
PHASE	CONSTRUCTION	MC / EO / ECO
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	1. A security company should be employed to guard the construction site and monitor access. This company should also be utilised for the operation phase.	

	<ol style="list-style-type: none"> 2. Labour should be transported to and from the site to discourage loitering in adjacent areas and possible increase in crime or disturbance. 3. Unsocial activities such as consumption or illegal selling of alcohol, drug utilisation or selling and prostitution on site shall be prohibited. Any persons found to be engaged in such activities should receive disciplinary or criminal action taken against them. 4. Only pre-approved staff must be permitted to stay within the staff accommodation in the event that staff accommodation will be provided. 5. The site shall be fenced, where necessary to prevent any loss or injury to persons during the construction phase. 6. No alcohol/ drugs are to be present or taken on site. 7. No firearms allowed on site or in vehicles transporting staff to / from site (unless used by security personnel). 8. Construction staff are to make use of the facilities provided for them, as opposed to ad-hoc alternatives (e.g. fires for cooking, the use of surrounding bush as a toilet facility are forbidden). 9. Trespassing on private / commercial properties adjoining the site is forbidden. 10. Driving under the influence of alcohol is prohibited. 11. All employees must undergo the necessary safety training and wear the necessary protective clothing. 12. The site must be secured in order to reduce the opportunity for criminal activity in the locality of the construction site. 	
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3.4.20 Social Environment

Table 30: Social Environment

IMPACT	SOCIAL ENVIRONMENT This section deals with social environment and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	CONSTRUCTION	MC / EO / ECO / CLO
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION	<ol style="list-style-type: none"> 1. All contact with the affected parties shall be courteous at all times. The rights of the affected parties shall be respected at all times. 2. A complaints register should be kept on site. Details of complaints should be incorporated into the audits as part of the monitoring process. This should be in carbon copy format, with numbered pages. Any missing pages must be accounted for by the Contractor. 3. Damage to infrastructure shall not be tolerated and any damage shall be rectified immediately by the Contractor. A record of all damage and remedial actions shall be kept on site. 4. Care must be taken not to damage irrigation equipment, lines, channels and crops. 	
SPECIFIC MITIGATION MEASURES		
	<ol style="list-style-type: none"> 5. Developers should be open to local recruitment processes and be willing to offer some skills transfer during this phase of the project to ensure maximum local labour procurement. 6. Recruitment should be done following a transparent approach and adequately communicated in the area to limit the chances of people staying for longer period in hope of finding a job. 7. Initiating the education campaign among the local community (in partnership with the community members already active in the area) focusing specifically on vulnerable groups of population and motivating them to make right choices in their lives. 8. Assist local communities crippled by high levels of drug and alcohol abuse through remedial intervention and awareness programs 	

	<ol style="list-style-type: none"> 9. Introduce awareness campaigns for local community members and workers on the dangers of substance abuse 10. Place more emphasis on the role of and need of a social worker in the area. 11. Proponent/project owner needs to establish a relationship with the local authorities such as the Hantam LM and local community leaders to ensure that the social economic development (SED) & economic development (ED) initiatives that are implemented during the pre-operational stage are aligned with the and relevant needs of the Loeriesfontein community. 12. It is also advisory to engage with the other project developers in the area and, where possible and feasible, coordinate the efforts and spending on community projects to ensure a balanced improvement in the standard of living of local residents and a holistic partnership-based approach to resolving local social ills. 13. Ensure clear communication of the project information and effective public participation processes to minimise the influx of migrant job seekers. 14. Movement of construction workers on and off construction site must be closely monitored and managed. 15. Prior construction, rules and regulations regarding presence of construction workers on site need to be devised in consultation with the land owners of directly affected and adjacent properties. 16. During construction, the rules and regulations must be clearly communicated to all workers, personal property must be respected and avoided. Penalties for not adhering to the rules should be communicated and enforced. 17. Manage workers to ensure that they are only on site during the reasonable working hours. 18. Adhere to the mitigations measures proposed by other environmental specialists (noise, visual, etc.) 19. Ensure the mitigation measure proposed to limit the influx of people and the prolonged negative effects of the migrants staying in the community after the construction are implemented. 20. Where possible and feasible, local procurement of labour, goods, and services must be practiced to maximise the benefit to the local economy. 21. Engage with the local authorities to inform them on the timeframes of the project. 	
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	<p>22. Where possible, assist the local municipality in ensuring that the quality of the social and economic infrastructure does not deteriorate by making use of social responsibility allocations.</p> <p>23. Engage with the local authorities to inform them on the timeframes of the project and possible risks from a service delivery perspective.</p> <p>24. Engage with the local municipality to discuss the potential impact on local road quality, social infrastructure, and demand for accommodation, as well as possible mitigation measures.</p> <p>25. Recruit local labour as far as possible so as to ensure that the benefits accrue to local households within the community.</p> <p>26. Employ labour-intensive methods as far as feasible in the construction phase.</p> <p>27. Where possible, sub-contract to local companies.</p> <p>28. Ensure that local labour is procured to maximise benefit to the local households.</p> <p>29. The project developer should appoint a service provider or local NGO to develop, implement and manage an STI & HIV/AIDS prevention programme and other educational campaigns. The service provider or NGO should specialise in these fields and should have sufficient experience with similar work.</p> <p>30. The prevention programme and educational campaigns should extend to the local community and should pay special attention to vulnerable groups such as women and youth.</p> <p>31. The project developer should engage with other companies planning to establish renewable energy facilities in the area to optimise their efforts in educating the local community and implementing preventative programmes.</p> <p>32. Raising awareness among construction workers on health issues, including HIV/AIDS.</p> <p>33. Make condoms available to employees and all contractor workers for free.</p> <p>34. Introduce alcohol testing on a weekly basis for construction workers.</p> <p>35. Developing a Code of Conduct for all employees related to the project, which includes no tolerance of activities such as alcohol and drug abuse.</p> <p>36. Initiating the education campaign among the local community (in partnership with the community members already active in the area) focusing on alcohol abuse, drug abuse, HIV/AIDS, STDs, etc. prior the start of construction and maintaining these throughout the project's duration.</p>	
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3.4.21 Heritage

Table 31: Heritage

IMPACT	CULTURAL AND HERITAGE ARTEFACTS This section deals with the impact that the new development has on potential archaeological artefacts of the site	RESPONSIBILITY
PHASE	CONSTRUCTION	MC / EO / ECO
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION / METHOD STATEMENT	<ol style="list-style-type: none"> 1. Any finds must be reported to the nearest National Monuments office to comply with the National Heritage Resources Act (Act No 25 of 1999) and to DEA. 2. Local museums as well as the South African Heritage Resource Agency (SAHRA) should be informed if any artefacts are uncovered in the affected area. 3. The contractor must ensure that his workforce is aware of the necessity of reporting any possible historical or archaeological finds to the ECO so that appropriate action can be taken. 4. Any discovered artefacts shall not be removed under any circumstances. Any destruction of a site can only be allowed once a permit is obtained and the site has been mapped and noted. Permits shall be obtained from the South African Heritage Resources Association (SAHRA) should the proposed site affect any world heritage sites or if any heritage sites are to be destroyed or altered. 5. Should any archaeological sites / graves be uncovered during construction, their existence shall be reported to the Project Company and MC immediately. 	
SPECIFIC MITIGATION MEASURES		
	<p>Palaeontology</p> <ol style="list-style-type: none"> 6. Recommended mitigation of the inevitable damage and destruction of fossil within the proposed development area would involve the surveying, recording, description and collecting of fossils within the development footprint by a professional palaeontologist. This work should take place after initial vegetation clearance has taken place but before the ground is levelled for construction. 	

	<p>7. The possibility of a negative impact on the palaeontological heritage of the area can be reduced by the implementation of adequate damage mitigation procedures. If damage mitigation is properly undertaken the benefit scale for the project will lie within the beneficial category.</p> <p>Heritage</p> <p>8. Monitor find spot areas if construction is going to take place through heritage significant sites.</p> <p>9. A management plan for the heritage resources needs then to be compiled and approved for implementation during construction and operations.</p> <p>10. Possible surface collections for sites with a medium to high significance as well as conducting a watching brief by heritage practitioner during the construction and operations.</p> <p>11. If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources are found during the proposed development, SAHRA APM Unit (Natasha Higgitt/Phillip Hine 021 462 5402) must be alerted. If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit (Thingahangwi Tshivhase/Mimi Seetelo 012 320 8490), must be alerted immediately. A professional archaeologist or palaeontologist, depending on the nature of the finds, must be contracted as soon as possible to inspect the findings. If the newly discovered heritage resources prove to be of archaeological or palaeontological significance, a Phase 2 rescue operation may be required subject to permits issued by SAHRA.</p>	
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3.4.22 Community Engagement

Table 32: Community Engagement

IMPACT	COMMUNITY ENGAGEMENT This section deals with surrounding community and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	CONSTRUCTION	EO / ECO / CLO
ENVIRONMENTAL MANAGEMENT PROGRAMME		

MITIGATION	<ol style="list-style-type: none"> 1. A communication guideline to be drafted and agreed upon with authority representatives and affected communities. 2. Open and transparent community engagement to be followed as culturally appropriate. 3. Records (written) are to be kept of all community engagements (e.g. complaints, resolutions, etc.). 	
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3.4.23 Visual Impact

Table 33: Visual Impact

IMPACT	VISUAL This section deals with visual issues and actions that need to be implemented during construction	RESPONSIBILITY
PHASE	CONSTRUCTION	MC / EO / ECO
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION METHOD STATEMENT	<ol style="list-style-type: none"> 1. Construction activities must not occur at night and lighting should only be erected where absolutely necessary. 2. Construction traffic must stick to designated routes or access roads. 3. Construction areas are to be kept clean and tidy. 4. Measures must be taken to suppress dust arising from construction activities. 5. Labour being transported to the site must take cognisance of litter and waste concerns. 6. Equipment being transported to the site must be covered with tarps. 7. Topsoil stockpiles must be well managed and seeded when possible if not utilised within three months. 8. It is recommended that equipment be stored discreetly so as not to increase visual impacts. 9. Construction must be conducted in the shortest possible time in order to reduce visual impacts. 	
SPECIFIC MITIGATION MEASURES		
	10. Carefully plan to reduce the construction period.	

	<ol style="list-style-type: none"> 11. Minimise vegetation clearing and rehabilitate cleared areas as soon as possible. 12. Maintain a neat construction site by removing rubble and waste materials regularly. 13. Make use of existing gravel access roads where possible. 14. Due to the fact that the access roads are to be used infrequently by internal contractors, dust suppression may not be viable in the long term. The developer should consider making use of a tarred construction road or a road with less chance of generating dust. 15. All reinstated cable trenches should be re-vegetated with the same vegetation that existed prior to the cable being laid. 16. Due to the fact that the access roads are to be used infrequently by internal contractors, dust suppression may not be viable in the long term. The developer should consider making use of a tarred construction road or a road with less chance of generating dust. 17. Limit the number of vehicles and trucks travelling to and from the proposed sites, where possible. 18. Ensure that dust suppression is implemented in all areas where vegetation clearing has taken place. 19. Ensure that dust suppression techniques are implemented on all soil stockpiles. 20. Temporarily fence-off the construction sites (for the duration of the construction period). 21. All reinstated cable trenches should be re-vegetated with the same vegetation that existed prior to the cable being laid, where possible. 	
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3.5 Operation Phase

3.5.1 Construction Site Decommissioning

Table 34: Construction Site Decommissioning

IMPACT	CONSTRUCTION SITE DECOMMISSIONING	RESPONSIBILITY
PHASE	OPERATION	MC / PROJECT COMPANY / ECO / EO
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION	<p>Removal of equipment</p> <ol style="list-style-type: none"> 1. All structures comprising the construction camp are to be removed from site. 2. The area that previously housed the construction camp is to be checked for spills of substances such as oil, paint, etc., and these shall be cleaned up. 3. All hardened surfaces within the construction camp area should be ripped, all imported materials removed, and the area shall be top soiled and regressed using the guidelines set out in the re-vegetation that forms part of this document. <p>Temporary services</p> <ol style="list-style-type: none"> 4. The Contractor must arrange the cancellation of all temporary services. 5. Temporary roads must be closed and access across these, blocked. 6. All areas where temporary services were installed are to be rehabilitated to the satisfaction of the ECO. <p>Associated infrastructure</p> <ol style="list-style-type: none"> 7. Surfaces are to be checked for waste products from activities such as concreting or asphaltting and cleared in a manner approved by the Engineer. 8. All surfaces hardened due to construction activities are to be ripped and imported material thereon removed. 	

	<p>9. All rubble is to be removed from the site to an approved disposal site as approved by the Engineer. Burying of rubble on site is prohibited.</p> <p>10. The site is to be cleared of all litter.</p> <p>11. The Contractor is to check that all watercourses are free from building rubble, spoil materials and waste materials.</p> <p>12. Fences, barriers and demarcations associated with the construction phase are to be removed from the site unless stipulated otherwise by the Engineer.</p> <p>13. All residual stockpiles must be removed to spoil or spread on site as directed by the Engineer.</p> <p>14. All leftover building materials must be returned to the depot or removed from the site.</p> <p>15. The Contractor must repair any damage that the construction works has caused to neighbouring properties, specifically, but not limited to, damage caused by poor stormwater management.</p> <p>Rehabilitation plan</p> <p>16. Rehabilitate and re-vegetate cleared areas with indigenous plant species that were present on site prior to construction.</p>	
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3.5.2 Operation and Maintenance

Table 35: Operation and Maintenance

IMPACT	OPERATION AND MAINTENANCE	RESPONSIBILITY
PHASE	OPERATION	PROJECT COMPANY
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION	<p>Maintenance</p> <p>1. All applicable standards, legislation, policies and procedures must be adhered to during operation.</p> <p>2. Regular ground inspection of the energy facilities must take place to monitor their status.</p>	

	<p>Public awareness</p> <p>3. The emergency preparedness plan must be ready for implementation at all times should an emergency situation arise.</p>	
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3.5.3 Surface and Groundwater

Table 36: Surface and Groundwater

IMPACT	SURFACE AND GROUNDWATER	RESPONSIBILITY
PHASE	OPERATION	PROJECT COMPANY
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION	<p>Surface water</p> <ol style="list-style-type: none"> 1. Correct drainage of the site should ensure that contaminants do not impact upon surface water. 2. The stormwater system on the proposed site needs to be regularly maintained to ensure effective working. <p>Monitoring and Reporting</p> <ol style="list-style-type: none"> 3. Specific activities that should be monitored include: <ul style="list-style-type: none"> ▪ Erosion potential (specifically in and around roads and stormwater discharge points). ▪ Stormwater management and design. ▪ Identified problem areas. 	
SPECIFIC MITIGATION MEASURES		
	<p>Minimising Vehicle Damage to the Surface Water Resources</p> <ol style="list-style-type: none"> 4. Potential impacts can be avoided by planning and routing of access / service roads outside of and away from all surface water resources and the associated buffer zones. <p>Where access through surface water resources are unavoidable and are absolutely required, it is recommended that any road plan and associated structures (such as</p>	

	<p>stormwater flow pipes, culverts, culvert bridges etc.) be submitted to the relevant environmental and water departments for approval prior to construction.</p> <p>5. Internal access and services roads authorised in sensitive areas will have to be regularly monitored and checked for erosion. Monitoring should be conducted once every month. Moreover, after short or long periods of heavy rainfall or after long periods of sustained rainfall the roads will need to be checked for erosion. Rehabilitation measures will need to be employed should erosion be identified.</p> <p>Erosion Management</p> <p>6. Where erosion begins to take place, this must be dealt with immediately to prevent significant erosion damage to the surface water resources. Should large scale erosion occur, a rehabilitation plan will be required. Input, reporting and recommendations from a suitably qualified wetland / aquatic specialist must be obtained in this respect should this be required.</p> <p>7. Control of erosion on the construction site in general must be managed through implementation of an erosion management plan. Erosion and subsequent sedimentation of surface water resources are considered significant impacts in terms of the proposed development that must be managed adequately throughout the operation of the proposed development.</p> <p>Stormwater Management</p> <p>8. Any hardstand area or building within 50m proximity to a surface water resource and the associated buffer zone must have energy dissipating structures in an appropriate location to prevent increased run-off entering adjacent areas or surface water resources. This can be in the form of hard concrete structures or soft engineering structures (such as grass blocks for example).</p> <p>9. A suitable operational storm water management plan should be compiled and implemented that accounts for the use of appropriate alternative structures or devices that will prevent increased run-off and sediment entering adjacent areas or surface water resources, thereby also preventing erosion. This must be submitted to the relevant environmental and water authority for approval, if undertaken.</p>	
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3.5.4 Biodiversity

Table 37: Biodiversity

IMPACT	BIODIVERSITY (FAUNA AND FLORA)	RESPONSIBILITY
PHASE	OPERATION	PROJECT COMPANY
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION	<p>Flora</p> <ol style="list-style-type: none"> 1. Indigenous vegetation must be maintained and all exotics removed as they appear and disposed of appropriately. 2. Re-vegetation of the disturbed site is aimed at approximating as near as possible the natural vegetative conditions prevailing prior to construction. 3. Vegetative re-establishment shall, as far as possible, make use of indigenous or locally occurring plant varieties within a 20-metre radius of the site. 4. Rehabilitation must be executed in such a manner that surface run-off will not cause erosion of disturbed areas during and following rehabilitation. <p>Fauna</p> <ol style="list-style-type: none"> 5. No faunal species must be harmed by maintenance staff during any routine maintenance at the development. 	
SPECIFIC MITIGATION MEASURES		
	<p>Bats</p> <ol style="list-style-type: none"> 6. Avoid areas of high bat sensitivity and their buffers as well as preferably avoid areas of Moderate bat sensitivity and their buffers. Adhere to operational mitigation measures described in Section 8 of the bat report. An operational phase bat monitoring study must be implemented as soon as the facility has been constructed. 7. Utilize lights with wavelengths that attract less insects (low thermal/infrared signature). If not required for safety or security purposes, lights should be switched off when not in use 	

or equipped with passive motion sensors. The mitigation measures will reduce the likelihood of certain bat species being favored.

8. The high sensitivity waterways can serve as commuting corridors for bats in the larger area, potentially lowering the cumulative effects of several WEF's in an area. Adhere to recommended mitigation measures for this project as described in Section 8 of this report. It is essential that project specific mitigations be applied and adhered to for each project, as there is no overarching mitigation that can be recommended on a regional level due to habitat and ecological differences between project sites. Adhere to the sensitivity map during any further turbine layout revisions.

General Fauna

9. Management of the site should take place within the context of an Open Space Management Plan.
10. No unauthorized persons should be allowed onto the site.
11. Any potentially dangerous fauna such as snakes or fauna threatened by the maintenance and operational activities should be removed to a safe location.
12. The collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden by anyone except landowners or other individuals with the appropriate permits and permissions where required.
13. If any parts of the site need to be lit at night for security purposes, this should be done with downward-directed low-UV type lights (such as most LEDs) as far as possible, which do not attract insects.
14. All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill.
15. All vehicles accessing the site should adhere to a low speed limit (40km/h max) to avoid collisions with susceptible species such as snakes and tortoises.
16. If parts of the facility such as the substation are to be fenced, then no electrified strands should be placed within 30cm of the ground as some species such as tortoises are susceptible to electrocution from electric fences as they do not move away when electrocuted but rather adopt defensive behavior and are killed by repeated shocks.

	<p>Alternatively, the electrified strands should be placed on the inside of the fence and not the outside.</p> <p>Flora</p> <ol style="list-style-type: none"> 17. All roads and other hardened surfaces should have runoff control features which redirect water flow and dissipate any energy in the water which may pose an erosion risk. 18. Regular monitoring for erosion after construction to ensure that no erosion problems have developed as result of the disturbance, as per the Erosion Management and Rehabilitation Plans for the project. 19. All cleared areas should be re-vegetated with indigenous perennial shrubs and grasses from the local area. These can be cut when dry and placed on the cleared areas if natural recovery is slow. 20. Wherever excavation is necessary, topsoil should be set aside and replaced after construction to encourage natural regeneration of the local indigenous species. 21. Due to the disturbance at the site as well as the increased runoff generated by the hard infrastructure, alien plant species are likely to be a long-term problem at the site and a long-term control plan will need to be implemented. Problem woody species such as <i>Prosopis</i> are already present in the area and are likely to increase rapidly if not controlled. 22. Regular monitoring for alien plants within the development footprint as well as adjacent areas which receive runoff from the facility as there are also likely to be prone to invasion problems. 23. Regular alien clearing should be conducted using the best-practice methods for the species concerned. The use of herbicides should be avoided as far as possible. 24. There should be an integrated management plan for the development area during operation, which is beneficial to fauna and flora. 25. All disturbed areas that are not used such as excess road widths, should be rehabilitated with locally occurring shrubs and grasses after construction to reduce the overall footprint of the development. 	
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3.5.5 Waste Management

Table 38: Waste Management

IMPACT	WASTE MANAGEMENT	RESPONSIBILITY
PHASE	OPERATION	PROJECT COMPANY
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION	<p>Recycling and litter management</p> <ol style="list-style-type: none"> 1. The site should be kept clear of litter at all times. 2. Solid waste separation and recycling should take place for the duration of the operational phase for the development at the administration block. 3. All waste must be removed promptly to ensure that it does not attract vermin or produce odours. 4. In house treatment procedures must be followed strictly. 5. Solid waste should be collected on a regular basis. 6. Package treatment plant must be regularly serviced. 	

3.5.6 Health and Safety

Table 39: Health and Safety

IMPACT	HEALTH AND SAFETY	RESPONSIBILITY
PHASE	OPERATION	PROJECT COMPANY
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION	<p>Emergency evacuation plan</p> <ol style="list-style-type: none"> 1. Upon completion of the construction phase, an emergency evacuation plan must be drawn up to ensure the safety of the staff and surrounding land users in the case of an emergency. 	

IMPACT	HEALTH AND SAFETY	RESPONSIBILITY
	<p>Maintenance</p> <p>2. The wind energy facility is to be regularly maintained. A maintenance schedule must be drawn up and records of all maintenance kept.</p> <p>Fire safety</p> <p>3. Firefighting equipment in the form of fire hydrants or fire extinguishers must be available on the site. These must be regularly maintained by an appropriate company.</p> <p>Storage and handling of hazardous waste</p> <p>4. Transformer oil containers must be regularly maintained to ensure that leaks do not occur.</p> <p>5. A spill kit needs to be kept on site to address any unforeseen spillages.</p> <p>6. Transport of all hazardous substances must be in accordance with the relevant legislation.</p> <p>7. The bund wall surrounding the transformer oil containers must be regularly maintained to ensure that any spills are completely contained.</p>	

3.5.7 Visual Impact

Table 40: Visual Impact

IMPACT	VISUAL IMPACT	RESPONSIBILITY
PHASE	OPERATION	PROJECT COMPANY
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION	<p>Maintenance and lighting</p> <p>1. Lighting must be kept to a minimum and restricted to low level, downward facing lights to reduce light spill;</p> <p>2. Lighting must be inward and downward pointing to reduce glare in surrounding areas.</p> <p>3. The wind energy facility area and surrounds must be kept clean, tidy and well maintained to reduce negative visual impacts;</p> <p>4. Rehabilitation of surrounding areas must take place with indigenous species;</p>	

IMPACT	VISUAL IMPACT	RESPONSIBILITY
	5. Surrounding roads must be well maintained; 6. Regular maintenance of exteriors and associated infrastructure must be undertaken.	
SPECIFIC MITIGATION MEASURES		
	7. Light fittings for security at night should reflect the light toward the ground and prevent light spill. 8. Due to the fact that the access roads are to be used infrequently by internal contractors, dust suppression may not be viable in the long term. The developer should consider making use of a tarred construction road or a road with less chance of generating dust. 9. Light fittings for security at the on-site 132kV substation at night should reflect the light toward the ground and prevent light spill. 10. The operation and maintenance buildings should not be illuminated at night. 11. If overhead power lines are required, align power lines to run parallel to existing power lines and other linear features, where possible. 12. Bury cables underground where possible. 13. The operation and maintenance building should be painted with natural tones that fit with the surrounding environment. Non-reflective surfaces should be utilised where possible. 14. Light fittings for security at the proposed renewable energy developments and their associated infrastructure at night should reflect the light toward the ground (except for aviation lighting) and prevent light spill. 15. The operations and maintenance buildings should not be illuminated at night, if possible. 16. Turbines should be painted plain white, as this is a less industrial colour. Bright colours or obvious logos should not be permitted. 17. Turbines should be repaired promptly, as they are considered more visually appealing when the blades are rotating (or at work). 18. The operation and maintenance buildings should be painted with natural tones that fit with the surrounding environment. Non-reflective surfaces should be utilised where possible. 19. If required, turbines should be replaced with the same model, or one of equal height and scale. Repeating elements of the same height, scale and form can result in unity and lessen the visual impact that would typically be experienced in a chaotic landscapes made up of	

IMPACT	VISUAL IMPACT	RESPONSIBILITY
	<p>diverse colours, textures and patterns.</p> <p>20. As far as possible, limit the number of maintenance vehicles, which are allowed to access the sites.</p> <p>21. Due to the fact that the access roads are to be used infrequently by internal contractors, dust suppression may not be viable in the long term. The developers should consider making use of tarred construction roads or roads with less chance of generating dust.</p> <p>22. Bury cables under the ground where possible.</p> <p>23. Select the alternatives that will have the least impact on visual receptors.</p>	

3.5.8 Noise Impact

Table 41: Noise Impact

IMPACT	NOISE IMPACT	RESPONSIBILITY
PHASE	OPERATION	PROJECT COMPANY
ENVIRONMENTAL MANAGEMENT PROGRAMME		
SPECIFIC MITIGATION MEASURES		
MITIGATION	<ol style="list-style-type: none"> 1. The residential dwelling is seldom used and the developer can ensure that the construction of Wind Turbines take place during a period when the owners are not using the property. 2. The developer can change the layout and not develop any wind turbines within approximately 1,200m from this dwelling (due to the cumulative effects of the number of wind turbines proposed in the area). 3. The developer can use a different wind turbine that has a maximum sound power emission level of less than 106dBA. 4. That no wind turbines are developed within approximately 1,200m from NSD02; 5. That the number of wind turbines closer than 2,200m from potential noise-sensitive receptors be reduced. 	

IMPACT	NOISE IMPACT	RESPONSIBILITY
	6. The developer can confirm periods when the dwelling will be used for residential purposes, and the closest wind turbines can be operated in a noise mode that generates less noise (less than 106dBA) or one or more of these wind turbines can be switched off. 7. Add noise monitoring points at any complainants that registered a valid noise complaint relating to the operation of the WEF.	
SPECIFIC MITIGATION MEASURES		
	8. Prevent the generation of nuisance noises; 9. The developer must change the layout to ensure that total cumulative noise levels are less than 45 dBA. This cumulative layout must be assessed by an independent acoustician	

3.5.9 Avifauna

Table 42: Avifauna

IMPACT	AVIFAUNA	RESPONSIBILITY
PHASE	OPERATION	PROJECT COMPANY
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION	1. Once the wind energy facility has been constructed monitoring should be implemented to assess mortalities, to to make comparisons with baseline conditions and compare actual collision rates with predicted collision rate. 2. Maintenance staff should not be allowed to access other parts of the property unless it is necessary project related work. 3. If actual displacement levels of priority species prove to be high, appropriate off-sets should be considered.	
SPECIFIC MITIGATION MEASURES		

	<ol style="list-style-type: none"> 4. Operational activities should be restricted to the plant area. Maintenance staff should not be allowed to access other parts of the property unless it is necessary for wind farm related work. 5. A 300m no-go buffer is proposed around water points as they serve as focal points for bird activity. 6. A 300m exclusion zone should be implemented around the Greater Kestrel nest where no construction activity or disturbance should take place. 7. Formal monitoring should be resumed once the turbines have been constructed, as per the most recent edition of the best practice guidelines (Jenkins et al. 2011). The exact scope and nature of the post-construction monitoring will be informed on an ongoing basis by the result of the monitoring through a process of adaptive management. The purpose of this would be (a) to establish if and to what extent displacement of priority species has occurred through the altering of flight patterns post-construction, and (b) to search for carcasses at turbines. 8. Monitoring should include rigorous assessment of the effect of turbines on the Red Lark, including possible displacement and disturbance effects. 9. As an absolute minimum, post-construction monitoring should be undertaken for the first two years of operation, and then repeated again in year 5, and again every five years thereafter. The exact scope and nature of the post-construction monitoring will be informed on an ongoing basis by the results of the monitoring through a process of adaptive management. 10. The minimum turbine tip height should be no less than 50m to reduce the risk of Red Lark mortality during display flight activity. 11. Depending on the results of the carcass searches, a range of mitigation measures will have to be considered if mortality levels turn out to be significant, including selective curtailment of problem turbines during high risk periods if need be. 12. If turbines are to be lit at night, lighting should be kept to a minimum and should preferably not be white light. Flashing strobe-like lights should be used where possible (provided this complies with Civil Aviation Authority regulations). 13. Lighting of the wind farm (for example security lights) should be kept to a minimum. Lights should be directed downwards (provided this complies with Civil Aviation Authority regulations). 14. The avifaunal specialist must approve the powerline design to ensure that bird-friendly structures are used. 	
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	15. Overhead cables should be marked using deflectors where required.	
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3.6 Decommissioning phase

The mitigation measures presented below are of relevance to the decommissioning of the wind energy facility. Furthermore, mitigation measures implemented during construction with regards to the construction camp and equipment, and social impacts, will remain the same for the decommissioning phase when a construction camp will need to be established again.

3.6.1 Ongoing Stakeholder involvement

The process that is recommended when the proposed wind energy facility is decommissioned, is provided in **Table 43** below.

Table 43: Ongoing Stakeholder Involvement

IMPACT	ONGOING STAKEHOLDER INVOLVEMENT	RESPONSIBILITY
PHASE	DECOMMISSIONING	PROJECT COMPANY
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION	<ol style="list-style-type: none"> 1. Community to be notified, as culturally appropriate, timeously of the planned decommissioning, e.g.: <ul style="list-style-type: none"> ▪ Proposed decommissioning start date; and ▪ Process to be followed. 2. Recommend that a meeting with community leader(s) be held before decommissioning commence to inform them: <ul style="list-style-type: none"> ▪ What activities will take place during the decommissioning phase. ▪ How these activities will impact upon the communities and/or their properties. ▪ Regarding the timeframes of scheduled activities 3. Regular interaction between the Project Company and community leader(s) during the decommissioning phase 4. A reporting office/ channel to be established should community members experience problems with contractors/ sub-contractors during the decommissioning phase. 5. A register to be kept of problems reported by community members and the steps taken to address / resolve it. 	

3.6.2 Community Health and Safety

Table 44: Community Health and Safety

IMPACT	COMMUNITY HEALTH AND SAFETY	RESPONSIBILITY
PHASE	DECOMMISSIONING	PROJECT COMPANY
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION	<ol style="list-style-type: none"> 1. Demarcated routes to be established for construction vehicles to ensure the safety of communities, especially in terms of road safety and communities to be informed of these demarcated routes. 2. Where dust is generated by trucks passing on gravel roads, dust mitigation measures to be enforced. 3. Any infrastructure that would not be decommissioned must be appropriately locked and/or fenced off to ensure that it does not pose any danger to the community. 	

3.6.3 Waste Management

Table 45: Waste Management

IMPACT	WASTE MANAGEMENT	RESPONSIBILITY
PHASE	DECOMMISSIONING	PROJECT COMPANY
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION	<ol style="list-style-type: none"> 1. All decommissioned equipment must be removed from site and disposed of at a registered land fill. Records of disposal must be kept. 2. Turbines must be returned to the manufacturer or relevant recycling agent to be recycled. 	

3.6.4 Surface and Groundwater

Table 46: Surface and Groundwater

IMPACT	SURFACE AND GROUNDWATER	RESPONSIBILITY
PHASE	DECOMMISSIONING	PROJECT COMPANY
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION	<ol style="list-style-type: none"> 1. Removal of any historically contaminated soil as hazardous waste must be undertaken. 2. Removal of hydrocarbons and other hazardous substances by a suitable contractor to reduce contamination risks must be undertaken. 3. Removal of all substances which can result in groundwater (or surface water) contamination must be undertaken. 4. Re-vegetation of exposed soil surfaces to ensure no erosion in these areas is to be undertaken. 	

3.6.5 Biodiversity

Table 47: Biodiversity

IMPACT	BIODIVERSITY	RESPONSIBILITY
PHASE	DECOMMISSIONING	PROJECT COMPANY
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION	<ol style="list-style-type: none"> 1. Rehabilitation of exposed surfaces with indigenous species. 2. Adherence to surface and groundwater mitigation measures to prevent secondary impacts on biodiversity. 3. Prevention of expansion of current footprints. 	
SPECIFIC MITIGATION MEASURES		
	<ol style="list-style-type: none"> 4. Keep to designated areas when storing building materials, resources, turbine components and/or large vehicles and keep to designated roads with all large vehicles. Damaged areas not 	

	<p>required after decommissioning should be rehabilitated by an experienced vegetation succession specialist. The mitigation measures will reduce the degree of habitat loss.</p> <ol style="list-style-type: none"> 5. Any potentially dangerous fauna such as snakes or fauna threatened by the decommissioning activities should be removed to a safe location prior to the commencement of decommissioning activities. 6. All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill. 7. All vehicles accessing the site should adhere to a low speed limit (40km/h max) to avoid collisions with susceptible species such as snakes and tortoises. 8. No excavated holes or trenches should be left open for extended periods as fauna may fall in and become trapped. 9. All above-ground infrastructure should be removed from the site. Below-ground infrastructure such as cabling can be left in place if it does not pose a risk, as removal of such cables may generate additional disturbance and impact, however, this should be in accordance with the facilities' decommissioning and recycling plan, and as per the agreements with the land owners concerned. 10. Any roads that will not be rehabilitated should have runoff control features which redirect water flow and dissipate any energy in the water which may pose an erosion risk. 11. There should be regular monitoring for erosion for at least 2 years after decommissioning by the applicant to ensure that no erosion problems develop as a result of the disturbance, and if they do, to immediately implement erosion control measures. 12. All erosion problems observed should be rectified as soon as possible, using the appropriate erosion control structures and re-vegetation techniques. 13. All disturbed and cleared areas should be re-vegetated with indigenous perennial shrubs and grasses from the local area. 14. Wherever excavation is necessary for decommissioning, topsoil should be set aside and replaced after construction to encourage natural regeneration of the local indigenous species. 	
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	<p>15. Due to the disturbance at the site alien plant species are likely to be a long-term problem at the site following decommissioning and regular control will need to be implemented until a cover of indigenous species has returned.</p> <p>16. Regular monitoring for alien plants within the disturbed areas for at least two years after decommissioning or until alien invasive are no longer a problem at the site.</p> <p>17. Regular alien clearing should be conducted using the best-practice methods for the species concerned. The use of herbicides should be avoided as far as possible.</p>	
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3.6.6 Air Quality

Table 48: Air Pollution

IMPACT	AIR POLLUTION	RESPONSIBILITY
PHASE	DECOMMISSIONING	PROJECT COMPANY
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION	1. Regular maintenance of equipment to ensure reduced exhaust emissions	

3.6.7 Visual Impact

Table 49: Visual Impact

IMPACT	VISUAL This section deals with visual issues and actions that need to be implemented during decommissioning	RESPONSIBILITY
PHASE	DECOMMISSIONING	MC / EO / ECO
ENVIRONMENTAL MANAGEMENT PROGRAMME		
MITIGATION METHOD STATEMENT	<ol style="list-style-type: none"> 1. Decommissioning activities must not occur at night and lighting should only be erected where absolutely necessary. 2. Decommissioning traffic must stick to designated routes or access roads. 3. Decommissioning areas are to be kept clean and tidy. 4. Measures must be taken to suppress dust arising from decommissioning activities. 5. Labour being transported to the site must take cognisance of litter and waste concerns. 6. Equipment being transported to the site must be covered with tarps. 7. Topsoil stockpiles must be well managed and seeded when possible if not utilised within three months. 	

	<p>8. It is recommended that equipment be stored discreetly so as not to increase visual impacts.</p> <p>9. Decommissioning must be conducted in the shortest possible time in order to reduce visual impacts.</p>	
SPECIFIC MITIGATION MEASURES		
	<p>10. Carefully plan to avoid any delays or extensions to the decommissioning period.</p> <p>11. Minimise vegetation clearing and rehabilitate cleared areas as soon as possible.</p> <p>12. Maintain a neat construction site by removing rubble and waste materials regularly.</p> <p>13. Make use of existing gravel access roads where possible.</p> <p>14. All reinstated cable trenches should be re-vegetated with the same vegetation that existed prior to the cable being laid.</p> <p>15. Limit the number of vehicles and trucks travelling to and from the, where possible.</p> <p>16. Ensure that dust suppression is implemented in all areas where vegetation clearing has taken place.</p> <p>17. Ensure that dust suppression techniques are implemented on all soil stockpiles.</p> <p>18. Temporarily fence-off the decommissioning sites (for the duration of the decommissioning period).</p>	

4 ADDITIONAL MANAGEMENT PLANS

4.1 Alien Invasive Management Plan

Table 50: Alien Invasive Management Plan

ALIEN INVASIVE MANAGEMENT PROGRAMME	
MITIGATION MEASURES	<ol style="list-style-type: none">1. Stockpiles should be kept clear of weeds and alien vegetation growth by regular weeding.2. Alien vegetation and the spread of exotic species on the site will need to be controlled.3. The contractor should be responsible for implementing a programme of weed control (particularly in areas where soil has been disturbed); and grassing of any remaining stockpiles to prevent weed invasion.4. Herbicide use shall only be allowed according to contract specifications. The application shall be according to set specifications and under supervision of a qualified technician. The possibility of leaching into the surrounding environment shall be properly investigated and only environmentally friendly herbicides shall be used.5. The use of pesticides and herbicides on the site must be discouraged as these can impact on important pollinator species of indigenous vegetation.6. Six monthly checks of the area should take place for the emergence of invader species.7. Mitigation measures mentioned for the construction phase above must be implemented for any maintenance of the development that may be undertaken during the operation phase.8. Correct rehabilitation with locally indigenous species.9. Monitoring programme to ensure that rehabilitation efforts are successful to ensure that risks such as erosion, spread of exotic species and the edge effect are avoided.10. Constant maintenance of the area to ensure re-colonisation of floral species.11. Regular removal of alien species which may jeopardise the proliferation of indigenous species.

4.2 Plant Rescue and Protection Plan

Table 51: Plant Rescue and Protection Plan

PLANT RESCUE PROTECTION PLAN	
MITIGATION MEASURES	<ol style="list-style-type: none"> 1. Preconstruction walk-through of the approved development footprint to ensure that sensitive habitats and species are avoided where possible. 2. A large proportion of the impact of the development stems from the access roads and the number of roads should be reduced to the minimum possible and routes should also be adjusted to avoid areas of high sensitivity as far as possible, as informed by a preconstruction walk-through survey. 3. Preconstruction environmental induction for all construction staff on site to ensure that basic environmental principles are adhered to. This includes topics such as no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, minimizing wildlife interactions, remaining within demarcated construction areas etc. 4. Preconstruction walk-through of the facility to identify areas of faunal sensitivity. 5. A pre-construction walk-through survey by the biodiversity specialist will be required during a favourable season to locate any protected plants / trees and/or sensitive species and/or ecological feature. This survey must cover the footprint of all proposed infrastructure, including internal access roads. If necessary, shift infrastructure to avoid impacts on species or specific features. 6. Vegetation clearing should only commence after the walk-through has been conducted and necessary permits obtained. The Northern Cape Nature Conservation Act permit conditions must also be complied with. 7. Vegetation clearing to be kept to a minimum. No unnecessary vegetation to be cleared. 8. Vegetation removal must be limited to the wind farm construction site. 9. Vegetation to be removed as it becomes necessary rather than removal of all vegetation throughout the site in one step. 10. Materials should not be delivered to the site prematurely which could result in additional areas being cleared or affected. 11. No vegetation to be used for firewood. 12. Gathering of firewood, fruit, muti plants, or any other natural material onsite or in areas adjacent to the site is prohibited unless with prior approval of the ECO.

	<ol style="list-style-type: none"> 13. Only vegetation within the study area must be removed. 14. Vegetation removal must be phased in order to reduce impact of construction. 15. Construction site office and laydown areas must be clearly demarcated and no encroachment must occur beyond demarcated areas. 16. All natural areas impacted during construction must be rehabilitated with locally indigenous plant species. 17. A buffer zone should be established in areas where construction will not take place to ensure that construction activities do not extend into these areas. 18. Construction areas must be well demarcated and these areas strictly adhered to. 19. The use of pesticides and herbicides in the study area must be discouraged as these impacts on important pollinator species of indigenous vegetation. 20. Soils must be kept free of petrochemical solutions that may be kept on site during construction. Spillage can result in a loss of soil functionality thus limiting the re-establishment of flora. 21. The grid access power line must span rocky areas in order to avoid transformation in these areas. 22. Soil stockpiles must not become contaminated with oil, diesel, petrol, garbage or any other material, which may inhibit the later growth of vegetation in the soil.
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In addition to the above, a detailed Plant Rescue and Protection Plan will be compiled, once the detailed designs are complete and the walk-through survey by the biodiversity specialist has been undertaken. This will only take place if the Wind Farm is environmentally authorised by the DEA and issued with a license by the Department of Energy (DoE).

4.3 Re-Vegetation and Habitat Rehabilitation Plan

Table 52: Re-Vegetation and Habitat Rehabilitation Plan

RE-VEGETATION AND HABITAT REHABILITATION PLAN	
MITIGATION MEASURES	<ol style="list-style-type: none"> 1. Re-vegetation should aim to accelerate the natural succession processes so that the plant community develops in the desired way, i.e. promote rapid vegetation establishment. 2. Re-vegetation of disturbed surfaces should occur immediately after construction activities are completed. This should be done through seeding with indigenous grasses.

	<ol style="list-style-type: none"> 3. All damaged areas shall be rehabilitated upon completion of the contract. 4. Re-vegetation of the disturbed site is aimed at approximating as near as possible the natural vegetative conditions prevailing prior to construction. 5. All natural areas impacted during construction must be rehabilitated with locally indigenous species typical of the representative botanical unit. 6. Rehabilitation must take place in a phased approach as soon as possible. 7. Rehabilitation process must make use of species indigenous to the area. Seeds from surrounding seed banks can be used for re-seeding. 8. Rehabilitation must be executed in such a manner that surface run-off will not cause erosion of disturbed areas. 9. Planting of indigenous tree species in areas not to be cultivated or built on must be encouraged. 10. Habitat destruction should be limited to what is absolutely necessary for the construction of the infrastructure, including the construction of new roads. In this respect, the recommendations from the Ecological Specialist Study should be applied strictly. Personnel should be adequately briefed on the need to restrict habitat destruction, and must be restricted to the actual construction area. 11. Monitoring programme to ensure that rehabilitation efforts are successful to ensure that risks such as erosion, spread of exotic species and the edge effect are avoided.
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4.4 Open Space Management Plan

Table 53: Open Space Management Plan

OPEN SPACE MANAGEMENT PLAN	
MITIGATION MEASURES	<ol style="list-style-type: none"> 1. A buffer zone should be established in areas where construction will not take place, to ensure that construction activities do not extend into these areas. 2. Vehicle movement should be restricted to authorised access roads. 3. Before construction begins, all areas to be developed must be clearly demarcated with fencing or orange construction barrier where applicable. 4. All Construction Camps are to be fenced off in such a manner that unlawful entry is prevented and access is controlled. Signage shall be erected at all access points in compliance with all applicable occupational health

and safety requirements. All access points to the Construction Camp should be controlled by a guard or otherwise monitored, to prevent unlawful access.

5. The contractor and ECO must ensure compliance with conditions described in the EA.
6. Records of compliance/ non-compliance with the conditions of the authorisation must be kept and be available on request.
7. Records of all environmental incidents must be maintained and a copy of these records be made available to the national and provincial departments on request throughout the project execution.
8. Site establishment shall take place in an orderly manner and all required amenities shall be installed at camp sites before the main workforce move onto site.
9. All construction equipment must be stored within this construction camp.
10. An area for the storage of hazardous materials must be established that conforms to the relevant safety requirements and that provides for spillage prevention and containment.
11. The Contractor must provide sufficient ablution facilities, in the form of portable / VIP toilets, at the Construction Camps, and shall conform to all relevant health and safety standards and codes. No pit latrines, French drain systems or soak away systems shall be allowed and toilets may not be situated within 100 meters of any surface water body or 1:100 year flood line. A sufficient number of toilets shall be provided to accommodate the number of personnel working in the area.
12. The Contractor shall inform all site staff to make use of supplied ablution facilities and under no circumstances shall indiscriminate sanitary activities be allowed.
13. No fires will be allowed and the Contractor must make alternative arrangements for heating. LP Gas may be used, provided that all required safety measures are in place. The Contractor shall take specific measures to prevent the spread of veld fires, caused by activities at the campsites. These measures may include appropriate instruction of employees about fire.
14. Environmental awareness training for construction staff, concerning the prevention of accidental spillage of hazardous chemicals and oil; pollution of water resources (both surface and groundwater), air pollution and litter control and identification of archaeological artefacts.
15. Project manager shall ensure that the training and capabilities of the Contractor's site staff are adequate to carry out the designated tasks.
16. Staff should be educated as to the need to refrain from indiscriminate waste disposal and/or pollution of local soil and water resources and receive the necessary safety training.

	17. Staff must be trained in the hazards and required precautionary measures for dealing with these substances
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4.5 Erosion Management Plan

Table 54: Erosion Management Plan

EROSION MANAGEMENT PLAN	
MITIGATION MEASURES	<ol style="list-style-type: none"> 1. To prevent erosion, material stockpiled for long periods (2 weeks) should be retained in a bermed area. 2. Areas which are not to be constructed on within two months must not be cleared to reduce erosion risks. 3. The area to be cleared must be clearly demarcated and this footprint strictly maintained. 4. The necessary silt fences and erosion control measures must be implemented in areas where these risks are more prevalent. 5. Wind screening and stormwater control should be undertaken to prevent soil loss from the site. 6. The use of silt fences and sand bags must be implemented in areas that are susceptible to erosion. 7. Other erosion control measures that can be implemented are as follows: <ol style="list-style-type: none"> a. Brush packing with cleared vegetation b. Mulch or chip packing c. Planting of vegetation d. Hydroseeding / hand sowing 8. Sensitive areas need to be identified prior to construction so that the necessary precautions can be implemented. 9. All erosion control mechanisms need to be regularly maintained. 10. Seeding of topsoil and subsoil stockpiles to prevent wind and water erosion of soil surfaces. 11. Retention of vegetation where possible to avoid soil erosion. 12. Vegetation clearance should be phased to ensure that the minimum area of soil is exposed to potential erosion at any one time. 13. Re-vegetation of disturbed surfaces should occur immediately after construction activities are completed. This should be done through seeding with indigenous grasses that were present on site prior to construction. 14. No impediment to the natural water flow other than approved erosion control works is permitted.

	<p>15. To prevent stormwater damage, the increase in stormwater run-off resulting from construction activities must be estimated and the drainage system assessed accordingly.</p> <p>16. Stockpiles not used in three (3) months after stripping must be seeded to prevent dust and erosion.</p>
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4.6 Storm Water Management Plan

A Storm Water Management Plan cannot be compiled until the detailed designs are complete, which will only take place if the Wind Farm is authorised by the DEA and issued with a license by the Department of Energy (DoE). It is however stipulated in this EMP that a Storm Water Management Plan must be compiled before any construction commences and implemented during the construction phase. Refer to **Section 3.4.7**.

4.7 Monitoring System

Table 55: Monitoring System

MONITORING SYSTEM	
MITIGATION MEASURES	<ol style="list-style-type: none"> 1. Monitoring should be undertaken to evaluate the success of mitigation measures. Monitoring methods must be in accordance with features that need to be monitored. 2. An area for the storage of hazardous materials must be established that conforms to the relevant safety requirements and that provides for spillage prevention and containment. 3. Environmental awareness training for construction staff, concerning the prevention of accidental spillage of hazardous chemicals and oil; pollution of water resources (both surface and groundwater), air pollution and litter control. 4. Spillage packs must be available at construction areas. 5. Proper storage facilities for the storage of oils, paints, grease, fuels, chemicals and any hazardous materials to be used must be provided to prevent the migration of spillage into the ground and groundwater regime around the temporary storage area(s). These pollution prevention measures for storage should include a bund wall high enough to contain at least 110% of any stored volume, and this should be sited away from drainage lines in a

	<p>site with the approval of the Project Manager. The bund wall must be high enough to contain 110% of the total volume of the stored hazardous material with an additional allocation for potential storm water events.</p> <ol style="list-style-type: none"> 6. These storage facilities (including any tanks) must be on an impermeable surface that is protected from the ingress of storm water from surrounding areas in order to ensure that accidental spillage does not pollute local soil or water resources. 7. An approved waste disposal contractor must be employed to remove and recycle waste oil, if practical. The contractor must ensure that its staff is made aware of the health risks associated with any hazardous substances used and has been provided with the appropriate protective clothing/equipment in case of spillages or accidents and have received the necessary training. 8. Where contamination of soil is expected, analysis must be done prior to disposal of soil to determine the appropriate disposal route. Proof from an approved waste disposal site where contaminated soils are dumped if and when a spillage / leakage occur should be attained and given to the project manager. 9. Topsoil and subsoil to be protected from contamination. This should be monitored on a monthly basis by a visual inspection of diesel/oil spillage and pollution prevention facilities. 10. Concrete and chemicals must be mixed on an impervious surface and provisions should be made to contain spillages or overflows into the soil. 11. Relevant departments and other emergency services should be contacted in order to deal with spillages and contamination of aquatic environments. 12. Soils must be kept free of petrochemical solutions that may be kept on site during construction. Spillage can result in a loss of soil functionality thus limiting the re-establishment of flora.
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4.8 Traffic Management Plan

Table 56: Traffic Management Plan

TRAFFIC MANAGEMENT PLAN	
MITIGATION MEASURES	<ol style="list-style-type: none"> 1. A designated transport coordination manager should be appointed to oversee and manage the traffic safety officers. Additionally, the designated transport coordination manager should inform and keep up-to-date the interested and affected parties of all the activities taking place that may have a direct impact on them.

	<ol style="list-style-type: none"> 2. A traffic safety officer shall be nominated to make all the necessary arrangements to maintain the required traffic measures for the duration of the project. The safety officer shall liaise daily with the transportation coordination manager to keep them apprised of the state of all the traffic arrangements. 3. All construction traffic shall comply with the legal load requirements as outlined in the National Road Traffic Act and National Road Traffic Regulations. 4. Construction traffic entering the site along busy public roads should be limited to times when peak hour traffic can be avoided. The peak traffic occurs during 7h00 to 8h30, and 16h00 to 17h30. Construction traffic can also be restricted further to avoid travelling on public holidays, long weekends, or at night. 5. During periods of high construction traffic entering and exiting the site, it is recommended that flagmen help direct the traffic. This will enable the safe movement of construction and public traffic at the entrance and reduce the number of potential conflicts. 6. The South African Road Traffic Signs Manual (SARTSM), Volume 2, June 1999 is to be used for all traffic during the construction activities of the proposed project. 7. Any damage caused by the construction vehicles to the existing road infrastructure shall be repaired in kind, prior to the completion of the project. 8. A dust suppression system for the gravel roads shall be in place to prevent excessive dust from the traffic polluting the air. 9. Trucks should stop at regular intervals to allow queuing vehicles to pass. 10. All abnormal loads must be transport under a permit. 11. A route study be undertaken to confirm the most appropriate route to site. 12. Dust suppression techniques should be utilised to reduce the impact on air quality for the surrounding area.
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4.9 Transportation Management Plan

Table 57: Transportation Management Plan

TRANSPORTATION MANAGEMENT PLAN	
MITIGATION MEASURES	1. For each convoy of abnormal vehicles/loads a designated safety officer shall be nominated.

2. All vehicles used during the transport of materials and in the construction activities are required to be roadworthy per the National Road Traffic Act (NRTA) and display all pertinent certificates as required.
3. For any vehicles that operate under an exemption permit, a roadworthy certificate may not be required; however the exemption permit will require that the vehicle is fit for operation on public roadways.
4. All vehicles travelling to and from the site shall adhere to all laws imposed by the law enforcement agencies, and shall comply with any requests made by the law enforcement officials.
5. All construction vehicles that are entering the site shall also be available via radio or telephone communication to the transport coordination manager. So that in the event of an emergency, all vehicles can be accounted for.
6. During the delivery of the wind turbine components, the person in charge shall be in communication with transport coordination manager, so that he/she may keep track and document the progress of the vehicles to facilitate any issues that may arise during the transportation phase.
7. All vehicles shall comply with the posted speed limits on public roads as well as the speed limits within the development.
8. All abnormal vehicles and loads to be transported are required to have a valid permit before any trip is begun.
9. SANRAL Western & Southern Region will need to be contacted in order to obtain consent for the abnormal load transport on their roadways.
10. An escort is required to accompany the abnormal vehicle to warn the normal travelling public and to promote the safe flow of traffic if the normal flow of traffic is disrupted by the abnormal vehicle.
11. Construction vehicles delivering raw materials to the site shall be covered to prevent any debris along the roads.
12. A Traffic Management Plan must be prepared once the Project advances to the preliminary phase. This plan should ensure that vehicles arrive in a dispersed manner throughout the day to reduce the impact to other road users. The plan should also promote the use of car sharing, especially from Loeriesfontein and the construction camp. Methods to improve driver safety should also be outlined, e.g. the use of speed cameras or Average Speed Over Distance (ASOD) cameras along particular sections such as the R358 to Loeriesfontein.
13. Even though the traffic generated would not be significant, the following requirements should still be met by the developer during the construction phase.

- | | |
|--|---|
| | <p>14. All abnormal loads must be transport under a permit.</p> <p>15. A route study be undertaken to confirm the most appropriate route to site.</p> |
|--|---|

4.10 Fire Management Plan

The intent of a Fire Management Plan (FMP) is to provide fire safety requirements to ensure that the construction and operation of a Wind Energy Facility is defensible from wildfire and, in turn, does not represent significant threat of ignition source for the surrounding native habitat.

It must be noted that during extreme fire conditions, there are no guarantees that a given structure will not burn. Precautions and mitigating measures identified in this plan are designed to reduce the likelihood that fire would impinge upon the proposed structures as well as minimise the impact of fires if they do occur. This FMP does not guarantee that fire will not occur in the area or that fire will not damage property or cause harm to persons or their property.

Mainstream will rely heavily on the co-operation and proactive participation between managers, employees and contractors to maintain a high level of Fire safety awareness at all times together with the procedural ramifications in case of an emergency.

This management plan is also a reflection of Mainstream's commitment towards the safeguarding of employees against Fire hazards, whilst complying with the requirements of the Fire Safety Act, 6 of 2002 and Occupational Health and Safety Act, 85 of 1993.

4.10.1 Fire and Maintenance of Access Roads to the Wind Farm Facility

- A primary access and escape route will be visible and known to all who visit the facility and will be controlled by a security gate.
- There will be other dedicated secondary gravel roads leading to/from the project site to/from the primary access.
- There will be more than one vehicular access gate leading into the project.
- An escape route map with safe gathering points need to be visible at all the entrance gates for anyone to familiarise themselves upon entry (and will be provided prior to construction once the final facility layout and building plans have been approved by the appropriate department/authority) .

4.10.2 Fire Safety Act, 6 of 2002

A copy of the fire safety act is to be available at the facility for everyone's easy access purposes.

4.10.3 Principles of Fire Safety

The aims of implementing measures to limit the incidences and spread of fire are:

- To ensure the safety of people, minimising loss of life and injury.
- To minimise loss of and damage to property and possessions.
- To minimise the negative impact on the environment.
- To safely and effectively extinguish fire when needed

4.10.4 Requirements in Terms of the South African Bureau of Standards (SABS)

All buildings erected within the boundaries of South Africa, from a fire safety point of view should comply with the SABS 0400:1990- The application of the National Building Regulations. The following requirements are appropriate and can be adapted for planning and design of buildings. Any building shall be so designed, constructed and equipped that in case of fire:

- The protection of occupants or users therein is ensured and that provision is made for the safe evacuation of such occupants of users.
- The spread and intensity of such fire within such buildings and the spread of fire to any other building will be minimised.
- Adequate means of access and equipment for detecting, fighting, controlling and extinguishing such fire are adapted.

4.10.5 Management Commitment

It will be the responsibility of managers to:

- Enforce such measures as may be necessary in the interest of the preservation of employee's safety including safety against fire.
- Permit employees to perform work only once the precautionary measures are put in place.
- Provide the necessary supervision to staff to ensure that precautionary measures are maintained.

- Ensure that the staff is adequately trained in fire procedures.
- Ensure that all staff is informed regarding their scope of authority.
- Ensure that the FMP is reviewed and updated regularly to meet the projects needs at that particular point in time.
- Ensure that the firefighting equipment is regularly serviced.
- Make sure that the FMP forms part of the facility induction which will be made compulsory for each new member to the facility to attend.

4.10.6 Employees' Contribution to Fire Management

The successful implementation of the FMP will require the full co-operation of every employee.

In this regard it will be expected of every employee to:

- Take care of the fire detection and fire protection systems and equipment.
- Any other Contractor or subcontractor to co-operate and ensure that any duty or requirement imposed on BioTherm, as the employer, through legislation, is complied with.
- Carry out any lawful order given to him/her and obey the fire procedures laid down, or authorised thereto, by BioTherm in the interest of health and fire safety.
- Report any situation which may cause fire to the supervisor and/or Health and Safety Representative.
- Be able to make recommendations to the relevant Safe and Healthy representative who will take the recommendation into consideration and if agreed upon then implemented.

4.10.7 Fire Prevention/Control

The following preliminary measures will be taken to try and prevent and/or control fires on site:

- Smoking and open flames will be prohibited in areas near flammable and/or combustible materials.
- Fire Fighting equipment will be sufficiently available on site and must comply with the relevant legislation.
- All equipment will be serviced annually and pressure tested every five years.

4.10.8 Response

- The facility must at all times have emergency numbers readily available to all employees and staff. These include the fire department as well as emergency care numbers to make sure that fires are quickly extinguished when they occur as well as the victims (if any) are medically treated and taken to a nearby hospital or clinic if needs be.
- The staff will be trained to use the firefighting equipment for small fires that can be contained but alternatively if the fire cannot be contained, the appropriate authorities should be contacted to assist in extinguishing the fire.
- If the fire cannot be contained, workers should clear the site in an orderly manner lead by a trained Health and Safety representative.
- During construction phase, fire protection measures like placing fire extinguishers on site are compulsory before any hot work can commence or where any flammable substances are present.
- During operation phase, Fire protection equipment like Fire Extinguishers will be situated at carefully selected locations for easy access during an emergency.

4.10.9 Management Plan

The following will form the key elements of the FMP:

- Legal Compliance
 - A work place that is safe and without risk to the health and safety of employees in compliance with the requirements of the Occupational Health and Safety Act 85 of 1993 and its regulations as well as the Fire Safety Act, 6 of 2002.
- Fire hazard identification and risk assessment
 - Identify any fire hazards and risks, then determine the extent and impact.
 - Endeavour to eliminate fire hazards and alternatively develop control measures to contain the fires.
- Fire Safety, Health and Environmental Proficiency
 - Make employees conversant with the fire hazards to their health and safety and the precautionary measures required with respect to these hazards through regular awareness.
 - Incorporate and discuss Fire Safety into the daily Toolbox talks.
- Written Safe Word Procedures
 - Develop written safe work procedures for all fire high risks and provide the necessary training to employees if needs be.
- Training and Education

- Include the fire management plan in all Health and Safety training as well as assessments and provide the necessary training and awareness to all categories of employees.
 - Provide awareness and training to all new employees including temporary employees and contractors on site.
- Prevention
 - Suitable preventative measures against exposure to hazards are an integral part of daily activities.
 - Personnel protective equipment should be provided for the protection of employees when necessary.
 - Corrective and/or fire preventative measures should be put in place.
- Elimination of Fire Incidents
 - The elimination of fire incidents, including injuries on duty to which employees and the public can be exposed to will be achieved through the proper investigation of any fire incidents. Factors which cause any fire incidences will be determined and then corrective and preventative measures will be developed and implemented in liaison with all relevant stakeholders.
- First Aid Kit
 - A first aid kit will be available on site which will contain all the necessary medication (e.g. pain medication) and equipment to pre-treat any fire injury depending on the magnitude of the injury. If the injury is too severe, the victim should be taken to the nearest hospital or clinic to be treated by professionals and not treated on site.
 - There will be a sufficient number of employees trained in first aid medical assistance in case of small controllable fire incidents occurring on site.
- Machinery, Plant and Equipment
 - All mechanical equipment will be safeguarded in order to protect the health and safety of persons that may be exposed to such equipment.
 - Regular maintenance of all equipment (including firefighting equipment) and inspections will be recorded.
 - Only equipment that is safe and in working condition will be used by the employees. Equipment is to be inspected every day before use.
- Sub-Contractors
 - Sub-contractors will sign an agreement with the Developer to ensure their compliance with the FMP.
 - Sub-contractors will work according to the Health and Fire Safety standards.

4.11 Environmental Awareness Plan

Legislation requires that a company who prepares an environmental management program must develop an environmental awareness plan describing the manner in which the company intends to inform his or her employees of any environmental risks which may result from their work and the manner in which the risks must be dealt with in order to avoid pollution or the degradation of the environment. In recognition of the need to protect our environment, environmental management should not only be seen as a legal obligation but also as a moral obligation.

This Environmental Awareness Plan is intended to create the required awareness and culture with personnel and contractors/service providers on environmental safety and health issues associated with the mining and beneficiation activities.

4.11.1 Policy on Environmental Awareness

This Environmental Awareness Plan must serve as the basis for the induction of all new employees (as well as contractors pending the nature of their work on site) on matters as described herein and read in conjunction with the EMP. The Plan will also be used to hone awareness of all employees on a continuous basis.

Specific environmental awareness performance criteria will also form part of the job descriptions of employees, to ensure diligence and full responsibility at all levels of the organisational work force.

4.11.2 *Implementation of Environmental Awareness*

General environmental awareness will be fostered among the project's workforce to encourage the implementation of environmentally sound practices throughout its duration. This will ensure that environmental accidents are minimised and environmental compliance maximised.

Environmental awareness will be fostered in the following manner:

- Induction course for all workers on site, before commencing work on site.
- Refresher courses as and when required.
- Daily toolbox talks at the start of each day with all workers coming on site, where workers can be alerted to particular environmental concerns associated with their tasks for that day or the area/habitat in which they are working.
- Displaying of information posters and other environmental awareness material in the general assembly points.

4.11.3 *Training and awareness*

The MC is to take responsibility for the management of their staff and sub-contractors on the project site during the construction phase and supervise them closely at all times. The onus is on the MC to make sure that all their staff and subcontractors fully comprehend the contents of the EMPr. The MC shall organise environmental awareness training programmes, which should, be targeted at the two levels of employment: management and labour.

4.11.4 *Training of construction workers*

All construction staff must receive basic training in environmental awareness, including the storage and handling of hazardous substances, minimisation of disturbance to sensitive areas, management of waste, and prevention of water pollution. They must be informed of how to recognise historical / archaeological artefacts that may be uncovered. They must also be appraised of the EMPr's requirements. Environmental awareness training programmes need to be formulated for these levels and must comprise:

- A record of all names, positions and duties of staff to be trained;

- A framework for the training programmes;
- A summarised version of the training course(s); and
- An agenda for the delivery of the training courses.

Such programmes will set out the training requirements, which need to be conducted prior to any construction works occurring and will include:

- Acceptable behaviour with regard to flora and fauna;
- Management and minimising of waste, including waste separation;
- Maintenance of equipment to prevent the accidental discharge or spill of fuel, oil, lubricants, cement, mortar and other chemicals;
- Responsible handling of chemicals and spills;
- Environmental emergency procedures and incident reporting; and
- General code of conduct towards I&APs.

The ECO may be requested to provide additional training (in a first language) on-site regarding environmental aspects that are unclear to the construction personnel. A translator may be required and requested to assist in this additional training. The cost for the translator will be borne by the MC.

5 CONCLUSION

The environmental and social impacts of the project were identified through the four project phases (pre-construction, construction, operation and decommissioning). Both positive and negative project impacts have been identified. The following section briefly describes some of the major impacts and proposed mitigation measures within each of the project phases.

5.1 Pre-Construction Phase

The first site activities before mobilization of equipment will be a survey, required for final design of the wind energy facility foundations and other infrastructure. There will be negative impacts on land associated with the construction of camps (temporary loss) and storage of construction materials (temporary loss), and foundations for the buildings (permanent loss) and wind turbines. Expectations of improvement in livelihood among locals should be addressed through public participation. Construction contracts will include environmental monitoring and management procedures and requirements. These must be in place prior to the commencement of any construction activities. Once the final site has been selected for the wind energy facility and the layout plans have been finalised a detailed geotechnical investigation should be undertaken.

5.2 Construction Phase

This phase of the activity will have both positive and negative impacts. The positive impacts are employment opportunities offered to the construction workers and any other labourer who will be hired to provide their services during the construction phase. The negative impacts would include wastes generated, accidents, health and safety, air, dust and noise pollution, vegetation clearance, soil erosion, socio-environmental issues, loss of vegetation, and compaction of soil. Most of the negative impacts are minor and temporary and the significance of the impacts can be greatly reduced by the implementation of mitigation measures, which are outlined in this EMP. The contractor shall ensure that all staff have adequate protective clothing and are adequately trained.

5.3 Operational Phase

The proposed project will have minimal negative effects which mainly relates to loss of aesthetic value and habitat. The habitat that will be lost is not regarded as pristine and therefore, is not viewed as significant. Most of the negative impacts are minor and the significance of the impacts can be greatly reduced by the implementation of mitigation measures, which are outlined in this EMP.

5.4 Decommissioning Phase

As with any project, the facilities used in this project will have a lifetime after which they may no longer be cost effective to continue with operation. At that time, the project would be decommissioned, and the existing equipment removed.

Potential environmental impacts caused during decommissioning are those, which will be mitigated as provided by the Environmental Management Programme. These include: noise and emissions to the surrounding environment, removal of hazardous waste and substances, fire, oil spills, wastes and public safety.

The disposal of materials from the decommissioned facility is not viewed as high risk. Much of the material would be recyclable (steel structures etc.) or inert (concrete foundations, etc.). These materials would however, need to be disposed of at a formal waste disposal or recycling centre.

Based on the above information, it is unlikely that the Project will have significant adverse social and environmental impacts. Most adverse impacts will be of a temporary nature during the construction phase and can be managed to acceptable levels with implementation of the recommended mitigation measures for the Project such that the overall benefits from the Project will greatly outweigh the few adverse impacts.

All the negative impacts could be easily mitigated. Generally, the proposed wind energy facility will result in appreciable benefits to the people in the project area of influence and bring opportunities for development to the country.

Complaints Record Sheet

Complaints Record Sheet

COMPLAINTS RECORD SHEET	File Ref:	DATE:
	Page of
COMPLAINT RAISED BY:		
CAPACITY OF COMPLAINANT:		
COMPLAINT RECORDED BY:		
COMPLAINT:		
PROPOSED REMEDIAL ACTION:		
ECO: _____ Date: _____		
NOTES BY ECO:		
ECO: _____ Date: _____ Site Manager: _____ Date: _____		

Annexure B

Management of Soils: Guidelines

Topsoil

- Source of topsoil
 - Topsoil shall be stripped from all areas that are to be utilised during the construction period and where permanent structures and access is required. These areas will include temporary and permanent access roads, construction camps, and lay down areas. Topsoil shall be stripped after clearing of woody vegetation and before excavation or construction commences.
 - The topsoil is regarded as the top 300mm of the soil profile irrespective of the fertility appearance, structure, agricultural potential, fertility and composition of the soil.
- Topsoil stripping
 - Soil shall be stripped to a minimum depth of 150mm and maximum depth of 300mm or to the depth of bedrock where soil is shallower than 300mm. Herbaceous vegetation, overlying grass and other fine organic matter shall not be removed from the stripped soil.
 - No topsoil which has been stripped shall be buried or in any other way be rendered unsuitable for further use by mixing with spoil or by compaction using machinery.
 - Topsoil shall preferably be stripped when it is in a dry condition in order to prevent compaction.
- Topsoil stockpiling
 - The Consulting Engineer or Environmental Control Officer shall stockpile stripped topsoil in areas, which have been approved. Soil stockpiles may take the form of windrows.
 - To prevent erosion, material stockpiled for long periods (2 weeks) should be retained in a bermed area.
 - Topsoil, mulch and subsoil stockpiles must be placed in higher-lying areas of the site, and must not be positioned within stormwater channels or areas of ponding.
 - Topsoil stripped from different soil zones shall be stockpiled separately and clearly identified as such. Under no circumstances shall topsoil obtained from different soil zones be mixed.
 - Soil stockpiles shall not be higher than 3m or stored for a period longer than one year. The slopes of soil stockpiles shall not be steeper than 1 vertical to 2.5 horizontal.
 - No vehicles shall be allowed access onto the stockpiles after they have been placed. Topsoil stockpiles shall be clearly demarcated in order to prevent vehicle access and for later identification when required.
 - Soil stockpiles must not become contaminated with oil, diesel, petrol, garbage or any other material, which may inhibit the later growth of vegetation in the soil.

- After topsoil removal has been completed, the Contractor shall apply soil conservation measures to the stockpiles where and as directed by the Consulting Engineer or Environmental Control Officer. This may include the use of erosion control fabric or grass seeding.

- Topsoil replacement
 - Topsoil shall be replaced to a minimum depth of 75mm over all areas where it has been stripped and over disused borrow pits, after construction in those areas has ceased. Topsoil placement shall follow as soon as construction in an area has ceased.
 - All areas onto which topsoil is to be spread shall be graded to the approximate original landform with maximum slopes of 1:25 and shall be ripped prior to topsoil placement. The entire area shall be ripped parallel to the contours to a minimum depth of 300mm.
 - Topsoil shall be placed in the same soil zone from which it had been stripped. However, if there is insufficient topsoil available from a particular soil zone to produce the minimum specified depth, topsoil may be brought from other soil zones at the approval of the Consulting Engineer or Environmental Control Officer.
 - Where topsoil that has been stripped by the Contractor is insufficient to provide the minimum specified depth, the Contractor shall obtain suitable substitute material from other sources at no cost to the employer. The suitability of the substitute material shall be determined by means of soil analyses, which are acceptable to the Consulting Engineer or Environmental Control Officer.
 - No vehicles shall be allowed access onto or through topsoil after it has been reinstated.
 - After topsoil reinstatement is complete, cleared and stockpiled vegetative matter shall be spread randomly by hand over the top soiled area. The vegetative material must be replaced on the areas from where it has been removed.

Annexure C

Eskom Requirements for Work in or near Eskom Servitudes

- 1) Eskom's rights and services must be acknowledged and respected at all times.
- 2) Eskom shall at all times retain unobstructed access to and egress from its servitudes.
- 3) Eskom's consent does not relieve the developer from obtaining the necessary statutory, land owner or municipal approvals.
- 4) The applicant will adhere to all relevant environmental legislation. Any cost incurred by Eskom as a result of non-compliance to any relevant environmental legislation will be charged to the developer.
- 5) Eskom's underground cables must be placed in sleeves encased in concrete across the width of the servitude, at the applicant's expense. This is only required in certain situations such as where frequent excavations might occur in the cable area. Materials to be used and relevant dimensions shall be determined by the internal assessor and by Project Engineering.
- 6) All underground cables in or crossing Eskom overhead sub-transmission and transmission servitudes shall be protected by concrete slabs placed 300mm above cables with danger tape markings and cable route/position indicated by standard concrete monuments.
- 7) No construction or excavation work shall be executed within 11 metres from any Eskom power line structure, and/or within 11 metres from any stay wire.
- 8) All work within Eskom's servitude areas shall comply with the relevant Eskom standards in force at the time.
- 9) If Eskom has to incur any expenditure in order to comply with statutory clearances or other regulations as a result of the developer's activities or because of the presence of his equipment or installation within the servitude restriction area, the developer shall pay such costs to Eskom on demand.
- 10) The use of explosives of any type within 500 metres of Eskom's services shall only occur with Eskom's previous written permission. If such permission is granted the developer must give at least fourteen working days prior notice of the commencement of blasting. This allows time for arrangements to be made for supervision and/or precautionary instructions to be issued in terms of the blasting process. It is advisable to make application separately in this regard.

- 11) Changes in ground level may not infringe statutory ground to conductor clearances or statutory visibility clearances. After any changes in ground level, the surface shall be rehabilitated and stabilised so as to prevent erosion. The measures taken shall be to Eskom's satisfaction.
- 12) Eskom shall not be liable for the death of or injury to any person or for the loss of or damage to any property whether as a result of the encroachment or of the use of the servitude area by the developer, his/her agent, contractors, employees, successors in title, and assignees. The developer indemnifies Eskom against loss, claims or damages including claims pertaining to consequential damages by third parties and whether as a result of damage to or interruption of or interference with Eskom's services or apparatus or otherwise. Eskom will not be held responsible for damage to the developer's equipment.
- 13) No mechanical equipment, including mechanical excavators or high lifting machinery, shall be used in the vicinity of Eskom's apparatus and/or services, without prior written permission having been granted by Eskom. If such permission is granted the developer must give at least seven working days' notice prior to the commencement of work to Mr. Cyril Nuttall (Tel. 013 693 4144 Fax: 013 693 4180) at Middelburg Technical Service Centre, Eskom Distribution. This allows time for arrangements to be made for supervision and/or precautionary instructions to be issued.

Note: Where an electrical outage is required, at least fourteen work days are required to arrange it.

- 14) No work shall commence unless Eskom has received the applicant's written acceptance of the conditions specified in the letter of consent and/pr permit. The applicant or his/her contractor on site must at all times be in possession of the letter of consent. Should the site agent or contractor on site not be able to produce the required approval on inspection all site activities will be stopped.
- 15) Eskom's rights and duties in the servitude shall be accepted as having prior right at all times and shall not be obstructed or interfered with.
- 16) Under no circumstances shall rubble, earth or other material be dumped within the servitude restriction area. The developer shall maintain the area concerned to Eskom's satisfaction. The developer shall be liable to Eskom for the cost of any remedial action which has to be carried out by Eskom.
- 17) The clearances between Eskom's live electrical equipment and the proposed construction work shall be observed as stipulated by Regulation 15 of the Electrical Machinery Regulations of the Occupational Health and Safety Act, 1993 (Act 85 of 1993).
- 18) Equipment shall be regarded electrically live and therefore dangerous at all times.
- 19) In spite of the restrictions stipulated by Regulation 15 of the Electrical Machinery Regulations of the Occupational Health and Safety Act, 1993 (Act 85 of 1993), as an additional safety precaution,

Eskom will not approve the erection of houses, or structures occupied or frequented by human beings, under the power lines or within the servitude restriction area.

- 20) Eskom may stipulate any additional requirements to eliminate any possible exposure to Customers or Public coming into contact or be exposed to any dangers of Eskom plant.
- 21) It is required of the developer to familiarise himself with all safety hazards related to Electrical plant.
- 22) Any third party servitudes encroaching on Eskom servitudes shall be registered against Eskom's title deed at the developer's own cost. If such a servitude is brought into being, its existence should be endorsed on the Eskom servitude deed concerned, while the third party's servitude deed must also include the rights of the affected Eskom servitude.
- 23) In the event of an application for the subdivision of land or rezoning it is essential that the conductor to ground clearance of an overhead line be confirmed. The conductor to ground clearance specified for land outside townships varies vastly from that inside townships. It could thus be necessary to increase the height of power lines to remain within the Regulations of the OHS Act.
- 24) Eskom (responsible professional engineer) requires:
 - Proposed design, longitudinal section included in letter of application,
 - As-built plans with co-ordinates, once constructed,
 - Ownership of the power line shall be clearly marked,
 - Where services run parallel to Eskom's, the applicant's power line will maintain a separation distance, centre line to centre line. The distance shall be determined by the internal assessor and must comply with access requirements and Occupation Health and Safety Act clearances and Eskom standards
- 25) If such permission is granted, the applicant must give at least fourteen work day's prior notice of the commencement of work to Mr. Cyril Nuttall (Tel. 013 693 4144 Fax: 013 693 4180) at Middelburg Technical Service Centre, Eskom Distribution. This allows time for arrangements to be made for supervision of and/or precautionary instructions to be issued in terms of the overhead power line construction.
- 26) Should the applicant or his contractor damage any of Eskom services during commencement of any work whatsoever, then Eskom's 24 hour Contact Centre Tel: 086 000 1414 must be dialed immediately to report the incident.

Any relocation of Eskom's services, due to the proposed prospecting, will be for the account of the Applicant. The Applicant will also be responsible for granting Eskom an alternative route for the power line. The Eskom Customer Contact Centre at 08600 37566 must be contacted in connection with any line deviation and costs.

John Geeringh (Pr Sci Nat)

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And

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